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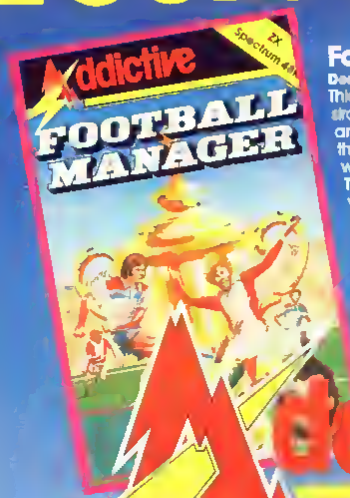
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"It's my own fault you *did* warn me – I am totally and completely hooked on FOOTBALL MANAGER." (Mr A. Wright – Lancashire)

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48K SPECTRUM ONLY

WHEELIE

One of the great games of 1984. Behind-colind graphics and sound: explains that 100% playable. Take off on your SuperDream bike, pump notes and ours, watch out for hedgehogs as you wheelie for the ghost rider. Will you beat him? Will you steal him? Keyboard or any joystick. And the same amazing graphics and sound if you prefer it 3D games we are inventing as this. *(Microsphere)* £5.95

THE BIRDS & THE BEES

The Bird Bug-Byte game enters Manic eaters which is right game. You are Boris the collecting nectar, but The Birds are out to get you. The birds the nectar pots the nest, the wasps—they're all after you. Of course it plays the Bumble the music and there are many screens that we have managed to get through. The graphics are excellent. Keyboard or Kempston/Protek/AGF joysticks. *(Bug-Byte)* £5.95

KRAKATOA

ESCAPE FROM KRAKATOA is a completely amazing piece of programming. Fantastic full-screen graphics and great music. Your helicopter is huge with a giant nose. The explosions from the volcano are very convincing indeed. It really has the biggest graphics and the most circulate scenery we've ever seen - and it is very playable. A must-get - it would not have been joystickable. No joysticks. *(Abbex)* £5.95

DOOMSDAY CASTLE

ZIGGY'S SECOND ARCADE/ADVENTURE. (Though it was released. The Pyramid you can buy that one! Same price) Ziggy able to explore 60 rooms of the castle to and rescue the 5 order stones. All in full-screen and wonderful graphics as you fight the URKS, GARTHROGS, GOOGLY BIRDS, KNUCLODS and ORPHACS all great different and may have personalities. It is quite immortable - and don't forget to keep. Fantasy may indeed hi-scores. *(Keyboard, Kempston/AGF/Fuller/Mikrogen/Protek (Fantasy)* £5.50

BUGABOO

"One of the most interesting and enjoyable games to appear" (YsComp) Have reviewed all around for this highly original game. As a very bad mutated flea all you do is try to jump up through a series of extremely beautifully coded caverns while avoiding a prior activity. Realtime clock, beautiful full-screen animation and amazing colours. No joysticks. *(Quicksilva)* £6.95

VALHALLA

160 different locations and 36 characters, all of whom have different personalities. Valhalla (left) can do anything bad. (PopCornyWhy) Valhalla is the only adventure where you can watch the animated characters play out the story. Join in if you wish. 6 adventures in one, print out graphics and cast, it has every trope with your spelling. Spellbinding state-of-the-art reviewed. No joysticks. *(Legend)* £14.95

GROUCHO

"Full of the great staple text coded text inside Phantom such a winner (PopCornyWhy) Find Arte Phantom Star and send a cop to Hollywood! A mad adventure with lots of good clues and even very good cartoon type animation. Footie Groucho and the Pianos around the USA. Discover the 22 codes and enter the studio and you win the trip. (Entries close 1/6/84.) A brilliant follow up to Phantom using every bit of the 48K. FREE 1st single on flipside may contain clues too. No joysticks. *(Automata)* £10.00

ANT ATTACK

The ants are horrifyingly effective. Its run graphics which are among the best I've seen (CompAdvCentre) The ants amazing 3D animation we've seen lately with ours reviewed all around. The 3D is so involving it's nearly potential 12 command keys and a game to improve your hands, accessibility in the city, life in Ants. No joysticks. *(Quicksilva)* £6.95

MANIC MINER

"The best-selling computer game in the country and deservedly so. superb (PersCompGames) One of the best games I've seen. *(PersCompToday)* Based on the USA arcade chart-topper Miner 2049er. Superb graphics and sound as you search each 20 screens each one a different arcade game 20-screen mania. Kempston joysticks. The most Spectrum game in the world. *Software Choice)* £5.95

HALLS OF THE THINGS

The most amazing and innovative game I have seen for the Spectrum (ZXComp. Explore an 8 storey mansion find treasures, evade ghosts BUT the more you can SEE exactly where you are and where you're going as the room scrolls as the as you run room. Brilliant graphics (try waving your mouse about as if it's your keys. No joysticks. *(Crystal)* £7.50

GO TO JAIL

Excellent graphics and open to control a very intuitive display *indeed highly recommended (ZXComp)* The and computer moment of the knock game we've ever seen. From 2 to 5 players (including the Spectrum or just it's ruthless but honest.) Every normal feature is faithfully reproduced and the screen display is marvellous. No joysticks. *(Automata)* £6.00

16/48K SPECTRUM

THE TRAIN GAME

An excellent game - original, well thought-out and full of screen controlling and amusing. (ZXComp) Run your own railway - change the points to most crashes watch out for hijackings by lone passengers. Full-screen graphics 30 command keys 2 extra layouts 7 train names 14 main levels! Demo mode and Pause while you go are needed. Very catching hobby! No joysticks. *Microsphere)* £5.95

PHEENIX

"That program has everything - explore, penetration, graphics and almost. Highly recommended" (HomeCompWhy) The full arcade action 5 screens in the near-ever Spectrum. Phoenix. 6 level control choose of character each control coded cream 48K quality now 16k. Kempston/AGF joysticks *(Megadodo)* £5.50

TRANZ AM

An explosive arcade challenging game "(PersComp View) Take your Red Barrel (full screen graphics) all over the USA - avoid the deadly Black turbine and collect the Gold Cups. Playing area is 800 TIMES YOUR SCREEN SIZE! Realtime clock, accurate explosive controlled acceleration, amazing Night Driver phase. Kempston, Cursor/Interface II joysticks. *(Ultimate)* £5.50

FROGGY

"The game is superb. (ZXComp) "Unreservedly recommended a stunning display (CommCompWhy) This Frogger is simple advised of the road - Leads in 2 game instructions and keyboard coded load - then the game which does so much more - you have no trouble even pointer. The classic game in all very other keys. Kempston/Quicksilva joysticks *(Liki)* £5.95

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ZX COM

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CONTENTS

Welcome 8
Brickbats or bouquets — we don t mind! Here you have the chance to air your views on the world of ZX computing

Danger UXB 13
One game you won t bomb out of! A super ZX81 game from Roger Harmsworth

Animation 17
Ever fancied yourself as a budding Walt Disney? Bring your graphics to life with this superb animation utility for your Spectrum from Duncan Ovarton

Twists 20
Avoid the hazards of Rubik s Wrist! A mind boggling game for your Spectrum from Paul Clansey

Asteroid Adventure 24
It s a battle in space with Roger Ditchburn and your ZX81!

Time Out 28
Be the envy of your friends — turn your Spectrum into a futuristic digital watch with Douglas Richardson

Rock Fall 32
Test your nerves and reactions with this all action game for the Spectrum from B Andrews

Trap It 37
D Popa gives you an easy way out of your error problems

King Kong 40
Monkey around with Nicholas Wyra and his great arcade game for your Spectrum

Mastering Machine Code On Your Spectrum 44
Turn your Spectrum into a wordprocessor with the final installment of Toni Baker's comprehensive machine code series

Countdown 50
Enhance your word power with Ben Rimmer's Spectrum quiz game

Home Base 52
Lost in space? Get back to base with David Naylor and your Spectrum!



Soft Selection . . . 56
Nick Pearce casts his critical eye on some of the latest ZX81 software releases

ZXC meets Durell Software 60
Ray Elder takes a peek behind the scenes at Durell Software in Somerset

Squares 65
Protect the peaceful citizens of the planet Nero from marauding space squares

Alphacom 32 Review 68
Ray Elder puts this new printer through its paces

Tunnel Run 72
Will you ever see the light at the end of the tunnel? Find out with David Link s fast moving Spectrum game

Computers in School 76
Interested in education? Read John Bourne s predictions for the future

Competition 80
Film buff or computer buff? Reach for the stars and win yourself a printer in our easy to-enter competition

MPUTING

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CONTENTS

News 83
All the latest Sinclair news and gossip as well as the latest releases from the software, hardware and computer book markets

Stocks and Shares . 91
Just the game for all you budding speculators from D. Bayliss and his ZX81

Readers' Reviews . 97
Take a look at what you, the reader, think of the latest software produced for the Sinclair micros

Depth Charge . . . 101
Somewhere in the depths lurks an enemy submarine — who's going to survive

The 1K Corral . . . 105
Minefield, Smugglers, Laser Defence and many more. All in 1K!!

Club Corner 109
Are there any like-minded computer fanatics out there? Find out on our club page

Valley of Death . . 110
Join the Light Brigade on their fateful charge. A super strategy game for the ZX81 from Jerome K. Laskowski

Problem Page . . . 114
Programming problems? Let Peter Shaw put you back on the right track

Interface 2 116
Cartridge power for your Spectrum. A full assessment of the new Sinclair release

Patience 117
Play the game and learn some programming skills on your ZX81



Pelmanism 121
If you can remember the rules of the game you're half way to winning!

Step by Step 123
Take this game one step at a time. It's not as easy as it looks!

Lost 127
Pete Cooke will really lose you with his ZX81 game!

Questionnaire . . 131
We want to find out what YOU want to see in the magazine — why not let us know

The Soft Touch . . 134
The latest Spectrum packages are put under the spotlight by James Walsh, ace reviewer

Machine Specifications . . 137
A reference guide to the Sinclair range of computers. It's all here!

Duck Shoot 142
What kind of a crackshot are you? Finding out will drive you quackers!

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ZX Computing is constantly on the look out for well-written articles and programs. If you think that your efforts meet our standards, please feel free to submit your work to us for consideration.

All submitted material should be typed if possible, handwritten work will be considered, but please use your neatest handwriting. Any programs submitted should be listed, a cassette of your program alone will not be considered. All programs must come complete with a full explanation of the operation and where relevant, the structure. Spectrum programs should be accompanied with a cassette of the program as well as the listing.

All submissions will be acknowledged and any published work will be paid for at competitive rates. All work for consideration should be sent to the Editor at our Golden Square address.

JUST AROUND THE CORNER, A NEVA

BLACK CRYSTAL

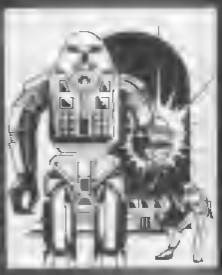


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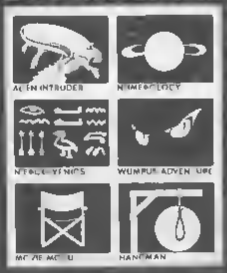
The Classic, six program game for the 48K Spectrum and 2X81 computers. No software collection is complete without a **Black Crystal** is an excellent adventure and a well thought out package. *Sinclair User, April '83* **Black Crystal** has impressed me by the sheer quantity and generally high quality of presentation. I am an avid adventurer and I have become an addict. *Home Computing Weekly, April '83* **Spectrum 48K** 180K of program in six parts only **£7.95** **ZX81 16K** over 150K of program in seven parts only **£7.95** **WHY PAY MORE FOR LESS OF AN ADVENTURE?**







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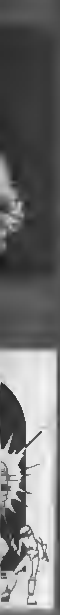




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Welcome

Once upon a time...

An unsuccessful amateur musician was setting up his equipment in the local Darby and Joan emporium in readiness to perform such delights es Led Zep's 'Rock n Roll" to geriatric head bangers, when a strange, unearthly sound issuing from a large box caught his attention

Curiosity aroused he continued to set up his gear until, the suspense being too great to bear, he aidled along the bar and up to the first Space Invaders machine that he'd ever seen

For many moons this son of Pan squandered coins of the realm to try end protect unwitting civilisation from destruction annihilation and the Intergalactic Tax Office New and more sophisticated beings evolved for him to fight against, Galaxiens, Defender, Scramble until, in a fit of desperation our hero, making all on an understanding bank manager invested in a Video Computer System in order to get in some extra practice against the alien horde — Atarible mistake

As was already mentioned our hero was a curious character by nature and also just a little devious

"Ah ha", though he "If I could find out how it works then I could probably beat them!"

And so he purchased the "Computer Programming" cartridge and keyboard set which gave him access to 64 BYTES of programmable RAM

Bells, stars, rockets and all manner of mental pyrotechnics were the order of the day music abandoned this fickle fellow follow the siren call of the mighty microchip and, only six months later, purchased a ZX81 with the Incredible 16K RAM

Well and truly bug bitten every spare moment was spent on this technological tantaliser Who was master and who was servant was hard to determine — Whiteouts Rampack wobble LOAD/SAVE problems all became the new aliens that he had to defeat until that fateful day his birthday when he was given a book on the ultimate enemy, YES, the dreaded machine code!

A new era of frustration was born but he persevered his friends ignored him, his parents thought he'd emigrated the cat did A vague shadowy figure and the mocking sound of "LD A, 0 DJNZ—3" was all anyone ever heard of him

Happily ever after . . .

But eventually the evil spell weakened and the great sorcerer Sinclair started to lose his acolyte He started to converse about such diverse subjects as food and money until the mighty magi pulled his master stroke — the Spectrum

Once again entangled in the complexities of the disease known to the medical fraternity as "Computus Fanaticus" with its attendant sub illnesses "Eyeballus Stramus" and "Fingerdigit Psority", he became an incurable case He became addicted to buying every magazine on the market, writing to them, producing programs reviews, articles ideas and generally made such a nuisance of himself that, to keep him occupied, someone eventually said "I know we'll give him a job which will keep him busy and out of our hair"

And they did

So hello everybody and welcome to this issue of *ZX Computing*

There's so much in it...

Seriously though I'm proud to be in the Editor's chair especially after it has seen the posteriors of such famous and competent personalities as Tim Hartnell and Roger Munford Roger has moved onwards and upwards and I'm sure you will all join me in wishing him much happiness and success

So, What's in this issue? Most of the items still bear Roger's seal of approval but I have tried to select a mixed bag of goodies, ranging from beginners programming Patience to expert with Toni Baker's Machine code program which is a first class word processor for the Spectrum!

All your old favourites are here, reviews by our usual team of writers, news on all the fields of Sinclairology and of course games utilities hints and tips and useful programs galore all written by your own brilliant selves

Ed's Project

On taking the seat of power I decided that the most significant contribution I could make to *ZX Computing* would be to produce clearer listings In fact the few complaints that I read all seemed to be related to this so I started what has been fondly called Ray's Project (or folly !)

I am trying to link a ZX81 and a Spectrum to a good dot matrix printer a Shinwa CP80 In order to do this I wrote to several companies asking for help and I also decided that, as my typing is of one finger &%$ variety it would be more than useful if wordprocessing was feasible Resisting the urge to get a BBC I wrote yet more letters The results of my search are eye opening and I'll be writing about the outcome in future issues Meanwhile in this issue is an item on one of my earlier adventures with the Alphacom 32 printer

I would like to thank personally all the companies involved for their assistance and will reveal all later, but special mention must be made of the DK'Tronics keyboard Kempston Centronics interface Memopak ZX81 interface and hi res graphics unit (I know there's a way to screen copy listings including graphics with this, but I haven't figured it out — YET) Micro Wordprocessor Sinclair Research — of course and Tasmen Wordprocessor and interface

A few of the programs in this Issue have been produced using some of this mahcinery see if you can spot them and tell us if you have time your opinions

Ed's Comment

I was surprised at the lack of ZX81 software which was sent for review only ONE program dropped through the door! A few quick phone calls produced a little more but you will notice that the ZX review section is a little sparse this month

Again my thanks to companies who rallied round Sinclair Research Artic Phipps Associates and JRS I am a great supporter of both machines and hope and believe that the ZX81 has still got a good deal of life in it *ZX Computing* will continue to support the ZX81 as long as it is being used

Software for the 81 was originally a mail order business and it looks as though it will return to that form The boss of Mikro Gen made an interesting comment to me at the Northern Computer Fair when he said that "it's not the software companies who are killing the ZX81, it's the shops who refuse to stock the soft were We have sold AS MANY programs for the ZX81 as for the Spectrum and have sold out of tapes!" This seems to be a case of the shop dictating to the customer so to try it out I went to a well known store and asked for an 81 program and was told "You should buy a Spectrum"

Of course we want to review all the latest programs for both computers but at the moment anyone producing ZX81 programs has a good chance of being reviewed due to the decline in new releases So keep 'em coming folks!

Contributions

We are always on the lookout for good programs and articles for future issues of *ZX Computing*, and where better to look than to our own readers If, when reading through the magazine you think you can write programs

as well or better than, our present contributors then let's hear from you.

All contributions are of course paid for at very competitive rates. So if you've got your eye on a new ZX add-on or you'd just like to supplement your pocket money get writing! It is vital though that all the programs you send us are totally original, and not borrowed or 'adapted' from other magazines or books. (When Tim Hartnell was sitting in the Editor's chair he even received original contributions he himself had written for his own books!)

Any kind of program (business domestic educational or just fun) will be welcomed but particularly those which use ZX BASIC in clever and efficient ways, or those which employ certain routines which can be re-used on other programs.

Program listings are vital along with a clear explanation of how the program is constructed what it does and what the user can expect to see once the program is RUN (a screen dump is particularly valuable in this respect). When submitting Spectrum programs it is very important to remember to enclose a cassette of the program as well as the listing, as this will allow us to check the program before publication.

Endlines

At the end of this issue there is a page which I would ask you to complete and return to us. I consider myself to be a custodian of your magazine and want to put in what you want to read. I've therefore put together a little questionnaire and if you will complete it for me I'll feed all the information into my Spectrum and see how, and if I can improve *ZX Computing*.

Enough said on with the show.

Ray Elder



Questions

Dear ZX Computing,

I am writing in desperation. I have owned a ZX81 for over a year now and to date have never been successful when trying to SAVE. I have tried most of the tricks as well as following the advice given in the manual and other publications. I have also tried three different types of cassette player, including a so-called computer-compatible model.

Incidentally very few problems have been experienced when LOADing. Any ideas?

Yours faithfully,

I G Windybank
Warwicks

Answers

Dear ZX Computing

I thought that you may be interested in an exceptionally simple way to improve the LOADing of a ZX81.

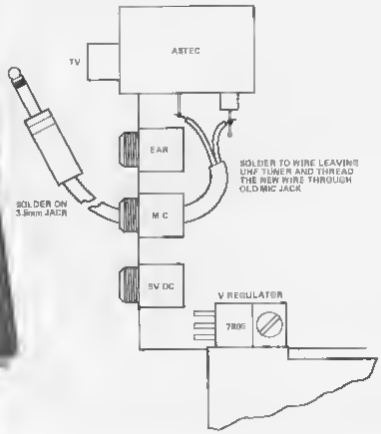
A few months ago my ZX81 showed its temperamental nature by refusing to give any from the 3.5 microphone jack. Rather than totally dismantling the '81 to find the fault I just permanently attached a wire to the computer. This little modification relies on the fact that the VDU when LOADing gets the same signal as the save jack hence the rather ugly black and white lines when LOADing/SAVEing.

As the diagram shows, I attached the wire to the small silver box of electronics which gives the VHF output. As a bonus this also gives a high pitched signal lasting six seconds before the actual program starts SAVEing. This is useful for if you listen to the cassette until the signal starts and start LOADing on the signal you are virtually guaranteed perfect LOADing/SAVEing.

Yours faithfully,

A Turner
Hull







And not many people know that

it is a generally known fact that it is impossible to break into a machine code program while it is running without turning your computer off and then on again, but this short machine code routine will prove otherwise

Once called, it brings into action a "Machine code break key" which allows the user to stop any machine code program regardless of what stage of execution the program has reached

This is obviously a very powerful and useful feature to have at your disposal especially if you are developing your own machine code programs where crashes are frequent, instead of having to turn the computer off and starting again you can stop the program and return to BASIC using the new break key

To enter the program you firstly need to type in the loader program below

```
1 REM (130 characters)
2 LET L=23835
3 INPUT I
4 POKE L,I
5 LET L=L+1
6 GO TO 3
```

RUN the program and enter the numbers below, one by one, pressing ENTER after each one

62,25,237,71,237,94,201,255
243,217,245,1,254,191,237,
120,254,188,40,4,217,241,
251,201,251,207,255

You may be wondering why the REM statement has 130 characters after it when the machine code routine is only 27 bytes long. The reason for this is very complicated but I can assure you that it is very necessary, so do not leave any of the characters out

After you have entered the machine code delete lines 2-6 and enter RANDOMIZE USR 23835. The machine code break key will now be working, it is very important that you do not delete the REM statment at any time or the computer will crash

To use the break key while in a machine code program press the L and ENTER keys down at the same time. You will hear a short beep followed by a "0 OK" report. The machine will have returned to BASIC and its memory will be intact.

Yours faithfully,

Richard Wright,
Surrey

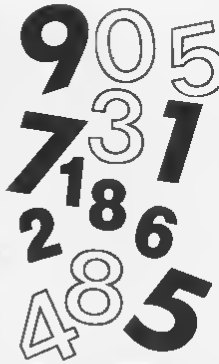


Figure problems?

Dear ZX Computing

I have had my 16K ZX81 for two months now and at the age of 40+ I think I've mastered it quite well. As I wish to use it for business as well as pleasure I was pleased to find the Bank Account program by Professor Salaman in your Oct/Nov issue. I typed it in and it ran but would not accept any figures. Whatever I put in came out as 0.00. However by deleting line 303 GOSUB 900 the program then worked perfectly and accepted my input figures

I did not have the time to continue so I SAVEd the program to use later. Unfortunately I had difficulty in LOADing it again but I think it is due to my equipment being faulty. I have ordered the Elinca ZX Tapeloader you previewed in the Oct/Nov issue so, hopefully this should no longer be a problem

I now have ZX Computing on order from the newsagents as I think it is well worth the money being crammed full of useful articles and programs and I am trying to build up a collection for my five year old grandson and two teenage daughters

Yours faithfully,

Mrs J F Hodge
Berks

Not so lucky dice

Dear ZX Computing,

I tried to use the programs on pages 27 (Lucky Dice) and 110 (3D Mover) in the Aug/Sept edition of ZX Computing but have run into difficulties

In the former the graphics seem to have been left out altogether and line 10 will not run. In the latter the program stops showing B/680. Are you able to help me please?

Yours faithfully,

John S Howard Vine
Surrey

I'm sorry about the problems, John. Lucky Dice was corrected last issue and the errant line in 3D Mover should read

*660 LET A=PEEK 16396+256*PEEK 16397*





Party Tricks?

Dear ZX Computing

We are planning a series of television programmes on the use of micro computers and are looking for two groups of people — first, celebrities who love messing with their micros and second any micro maniacs who have developed extraordinary uses for their computers. We do want extraordinary uses — not just unusual games but blowing up balloons or feeding the dog

Can any of your readers help us I wonder? If so, perhaps they could write to me direct.

Yours faithfully

Adam Hart Davis, Producer
Yorkshire Television Ltd
The Television Centre
Leeds LS3 1JS

Golf problems

Dear ZX Computing,

I have been a regular reader of ZX Computing for a few months now and my opportunity came last week (when I bought a Spectrum) to try out the Golf and Space Attack programs in the Oct/Nov issue

Being a complete beginner to computing it took me a while to program Space Attack and I was pleased when I had finished it. After correcting a few mistakes (mine of course) I ran it, checked it and SAVEd it. Having successfully completed that program I felt con

fident enough to attempt the Golf game

It took me two evenings, non stop to type in the program and when finished I ran it, fully expecting to see that I'd made a mistake or two. Unfortunately up on the screen came 2 variable not found 2520 2

I checked and rechecked and found nothing wrong, as did a friend. Not being one to give up easily I concentrated on line 2520 and came up with 2515 LET fairway=6 and 2516 LET green=4

Once these two lines were typed in the program worked correctly.

I would like you opinion as to whether it is just my Spectrum that needs these extra lines or is there an omission in the program?

Yours faithfully,

Stephan J Moffat
Glasgow

PS Very good magazine!

Thanks for your help Stephen. These lines should have been initialised on lines 1360 and 1780. We apologise for any problems that readers have found with the Golf program and would be pleased to send out a corrected listing on receipt of an sae. Please write to ZX Computing Golf Listing, No 1, Golden Square, London W1R 3AB





Drive on

Dear ZX Computing

I am thinking about puchasing a ZX Microdrive but before doing so I would like to know if you can SAVE programs in the same way as on an audio cassette that is by locating programs at various points on the disc

Is it possible to SAVE many short programs on one disc?

Yours faithfully,

Chris Moss
Essex

Yes. This and the speed of search with high speed loading is what makes the Microdrive so exciting

A slap on the wrist

Dear ZX Computing,

Having recently been given a ZX81 I purchased the Oct/Nov copy of ZX Computing. I am bitterly disappointed at the result of this purchase as almost all the programs that I have tried have either failed to run or been impossible to read.

For example in Fruit Machine on page 48 line 75 should read A$ and line 90 cannot be inserted. LET A$ — should be a separate line inserted at the beginning of the program. Also giving the character codes for the graphics is ludicrous and just makes life difficult. Otherwise it is a clever little game.

Foolishly perhaps I turned to Grand Prix Driver on page 13. This appears to be a total disaster area. I think there are some lines missing between 800 and 850 and as far as I can tell the graphics between 2113 and 2440 are from another game! The main display (4000 to 4220) seems to be a black rectangle but the printing is so poor that some of it may be meant to be grey — who knows?

What a shambles.

Yours faithfully,

J N Burke
Herts

Lines 2113 2440 in Grand Prix Driver are OIL SLICKS. Although I feel that your criticisms are a bit strong, as you will have read, it is my intention to improve the listings (Editor's Project) but we're not afraid of criticism are we (sulk)

NOTICE

Some of the programs in this issue have been produced on a different dot matrix printer in an effort to improve the clarity of the listings. The User Defined Graphics have been replaced by the letters A to U which are the natural state of these characters. In the following programs make sure the characters entered in the lines given are entered in graphics mode.

DEPTH CHARGE lines 130, 300 310 610 745 3060, 3090
PELMANISM lines 127 413 9700
SQUARES lines 3, 190
WALL WALK lines 50 60, 100 150 160 170 180 200 213 300, 310 380, 400 405, 410 470 610 620 640 720, 740 780 790 800 820
DUCK SHOOT lines 19 40

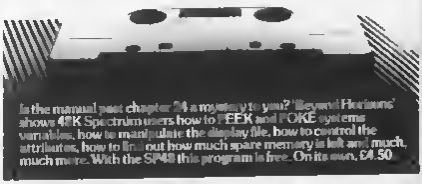
WARNING

Since preparing this issue we have found that programs which use the IN function to read the keyboard sometimes don't work on the latest issue 3 Spectrums. The easy solution is to replace them with suitable INKEY$ functions. If you have purchased your Spectrum recently and are not yet experienced enough to alter them may I humbly suggest that you wait until you know a little more before attempting to enter them. We will be bearing this in mind when selecting programs for the next issue — my apologies to you all.

NEW PRODUCT
48/80 FORTH

Extend your 16k Spectrum to 48k for just £23·00.

And get a Free program worth £4·50 into the bargain.



SP48, 32K Memory Extension with Program — £23.00

Now you SP48 [illegible] the full 48K of the Spectrum [illegible] you the opportunity to be able to use this vastly [illegible] and [illegible].

For £23 [illegible] the SP48 and [illegible] provided by Sinclair on your [illegible] and have a standard 16K Spectrum fully compatible with [illegible] and [illegible] assumption.

There are [illegible] areas. And the SP48 carries our full [illegible] and [illegible] exchange basis to SP80.

Then all you need to [illegible] your 48K guide program 'Beyond Horizons' and your 48K computer will [illegible] the [illegible] memory within, need to labour through [illegible] manuals. It's [illegible] you the [illegible] how easy it is to get [illegible] memory [illegible].

SP80 Paged Memory Extension — £46

The [illegible] gives a 16k Spectrum two [illegible] each and a [illegible] of 80K of RAM. It can be used as a standard 48k machine but pages can be switched in [illegible] instructions within your program. The SP80 is not recommended [illegible] beginners unless used with the SP FORTH.

Fitting [illegible] and Sinclair add-on [illegible] of the [illegible] to the SP48. Fit and Test service [illegible] £3.00, registered post £.£.

48/80 FORTH — £14.95

The new FORTH [illegible] the [illegible] complete version of FIG FORTH [illegible] Each [illegible] a 48K version and an 80K version. Don't [illegible] SP48 and [illegible] for an SP80.

48/80 FORTH [illegible] the [illegible] made [illegible] with the programming [illegible] of BASIC and [illegible] FORTH versions all [illegible] Spectrum's excellent [illegible] and sound is still available using BEEP, CAT, and [illegible] are also included.

ZX Slowloader — £10

This [illegible] of software [illegible] only you [illegible] easily [illegible] SAVE [illegible] you'd [illegible] weekend [illegible].

All products [illegible] are [illegible] stock at the [illegible] despatch for phoned [illegible] and Visa orders.
The East London Robotics Ltd. Please send by [illegible] required.

- [ ] SP48 (Issue 1 £35) (Issue 2 £3[illegible]) — [illegible]
- [ ] SP80 (Issue 1 £50) (Issue 2 £46) — [illegible]
- [ ] SLOWLOADER £10 — [illegible]
- [ ] BEYOND HORIZONS program £4.50 — [illegible]
- [ ] 48/80 FORTH £14.95 — [illegible]

Postage U65p. I enclose a cheque/PO to _____ My [illegible]

Name _____

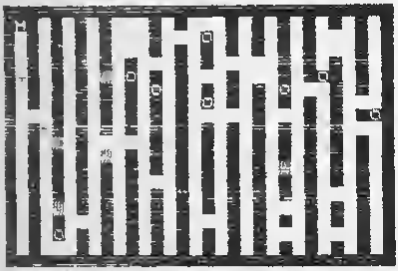
Address _____

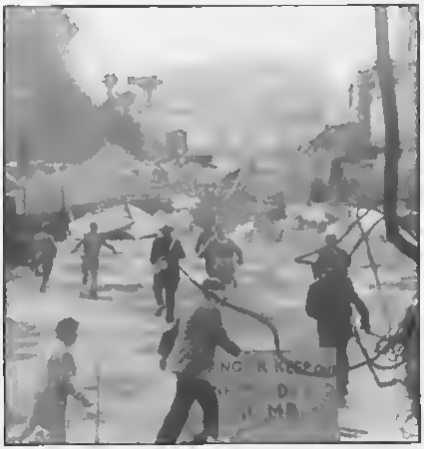
East London Robotics Ltd. [illegible]
24 Holly Avenue, [illegible]
Tel: (01) 4[illegible]
24 Holly Avenue, [illegible]
Tel: 01-4[illegible]
Sorry, no [illegible] to 01-4[illegible]
Telex: 8811[illegible]

EAST LONDON ROBOTICS

Danger UXB

You'll need a lot of energy to keep up with Roger Harmsworth and his program for the ZX81.





Lines 3000 3020 The routine controlling what happens if the door of HOME shuts on you before you have reached it
Lines 4000 4130 Provide the inverse screen
Lines 4140 4239 Provide information on the evaporator
Lines 4240 4310 The routine controlling what happens if you reach the shuttle on the planet DX4
Lines 7000 7180 The routine controlling what happens if you fall down a chute on the first level of the corridors
Lines 8000 8100 The routine controlling what happens if you manage to find an elevator on the lower level
Lines 9000 9040 Draw up another map showing where you are
Lines 9800 9860 The routine controlling what happens if you fall down too many chutes
Lines 9900 9940 The routine controlling what happens if you are evaporated too many times
Lines 9950 9970 The SAVE routine

```
  2 LET H=0
  5 LET TI=240
 10 LET F=0
 15 LET C=0
 20 LET Y=0
 25 CLS
 30 LET G=0
 35 LET Z=0
100 PRINT "D A N G E R  UXB"
110 PRINT '''"      YOU ARE GIVE
N INSTRUCTIONS"
120 PRINT '''"TO GO TO THE PLANE
T ZAPHOD.USING"
130 PRINT '"A PASS YOU ARE ABL
E TO BOARD THE"
140 PRINT ''"10.15 SHUTTLE TO J
UPITER."
150 PRINT '''"THERE YOU BOARD A
PRIVATE CRAFT"
160 PRINT '"WHICH TRANSPORTS Y
OU TO ZAPHOD."
170 PRINT '''"LANDING IN A SECRE
T CAVERN YOU"
180 PRINT '"ARE GIVEN INSTRUCTI
ONS TO GO AND"
190 PRINT '"RETREVE SOME HIGH
POWER CELLS."
200 PRINT '"HIT A BUTTON"
210 IF INKEY$="" THEN GOTO 210
220 CLS
```


Lines 100 490 Provide instructions for the game
Lines 492 625 Set up the screen display
Lines 630 780 Move the monster Tri Hex and your own character represented by an * while checking which square you have moved into each time you move
Lines 1000 1010 The death routine
Lines 1020 1170 Ask you if you would like to play another game
Lines 2000 2070 The routine controlling what happens if you reach HOME

```
 230 PRINT "D A N G E R  [EXE]"
 240 PRINT ,,"THE CELLS WILL SAV
E THE PLANET"
 250 PRINT ,,"EARTH FROM ENERGY
STARVATION"
 260 PRINT ,,,"BEGINING IN THE
CAVERN YOU WALK"
 270 PRINT ,,"DOWN A SMALL PASSA
GE UNTIL YOU"
 280 PRINT ,,"COME TO THE MIDDLE
OF THE PLANET"
 290 PRINT ,"WHERE YOU START TO
LOOK FOR THE"
 300 PRINT ,,"POWER CELLS...[2 SPACES]
[LIGHT]"
 310 PRINT ,,,,"HIT A BUTTON"
 320 IF INKEY$="" THEN GOTO 320
 340 CLS
 350 PRINT "D A N G E R  [EXE]"
 360 PRINT ,,,,"  *  =  YOU"
 370 PRINT ,,"  E  =  MONSTER"
 380 PRINT ,,"  [SPACE]  =  WALL"
 390 PRINT ,,"  [SPACE]  =  POWER CELLS"
 395 PRINT ,,"  [SPACE]  =  HOME"
 400 PRINT ,,,"5  TO GO LEFT"
 410 PRINT ,,"6  TO GO RIGHT"
 420 PRINT ,,"6  TO GO SOUTH"
 430 PRINT ,,"7  TO GO NORTH"
 432 PRINT ,,"  HIT A BUTTON"
 434 IF INKEY$="" THEN GOTO 434
 436 CLS
 438 PRINT "D A N G E R  [EXE]"
 439 PRINT ,,"  [SPACE]  =  CHUTE"
 440 PRINT ,,"  [SPACE]  =  ELEVATOR"
 441 PRINT ,,"  [SPACE]  =  SHUTTLE"
 442 PRINT ,,"  [SPACE]  =  EVAPERATER"
 445 PRINT ,,"I FORGOT...THERE
IS A MONSTER"
 450 PRINT ,,"CALLED TRI HEX KEE
P OUT OF HIS "
 460 PRINT ,,"WAY AT ALL COSTS
[2 SPACES] [LIGHT]"
 470 PRINT ,,,"HIT A BUTTON"
 480 IF INKEY$="" THEN GOTO 480
 490 CLS
 492 GOSUB 4000
 495 FAST
 510 LET ZZ=1+PEEK 16396+256*PEE
K 16397
 520 LET A=ZZ+6
 540 FOR D=0 TO 19
 550 PRINT AT D,0,"[SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE]"
 560 NEXT D
 570 PRINT AT 0,0,"[SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE]"
 580 PRINT AT 19,0,"[SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE][SPACE]"
 585 PRINT AT 8,2,CHR$ 0,AT 16,4
,CHR$ 0,AT 15,6,CHR$ 0,AT 10,0,C
HR$ 0,AT 10,14,CHR$ 0,AT 13,12,C
HR$ 0,AT 3,14,CHR$ 0,AT 5,15,CHR
$ 0,AT 8,16,CHR$ 0,AT 4,20,CHR$
0,AT 17,22,CHR$ 0,AT 6,24,CHR$ 0
 AT 2,26,CHR$ 0,AT 7,28,CHR$ 0
 586 IF F=1 THEN GOTO 595
 587 FOR D=0 TO 10
 588 PRINT AT INT (RND*17)+1,INT
(RND*29)+1,CHR$ 128
 589 NEXT D
 590 FOR D=0 TO 4
 591 PRINT AT INT (RND*17)+1,INT
(RND*30)+1,CHR$ 136
 592 NEXT D
 593 PRINT AT 1,1,"[SPACE]"
 594 PRINT AT INT (RND*17)+1,INT
(RND*30)+1,"[SPACE]"
 595 FOR D=0 TO 25
 600 PRINT AT INT (RND*17)+1,INT
(RND*29)+1,CHR$ 0
 610 NEXT D
 620 LET B=(ZZ+36)
 621 LET T=B
 622 LET O=0
 623 IF F=1 THEN GOTO 9000
 625 SLOW
 630 POKE A,23
 640 POKE B,12
 650 LET W=A
 652 LET R=B
 655 PRINT AT 21,0,"CELLS ",C,"
 TIME LEFT ",TI,"  "
 656 POKE A,0
 657 POKE B,0
 659 LET TI=TI-1
 660 LET A=A+(INKEY$="0")-(INKEY
$="5")
 665 IF TI<=0 THEN GOTO 3000
 670 IF INKEY$="6" THEN LET A=A+
33
 680 IF INKEY$="7" THEN LET A=A-
33
 690 IF PEEK (A)=128 THEN LET A=
W
 692 IF O=0 THEN LET B=B+33
 694 IF O=1 THEN LET B=B-33
 715 IF B<=T THEN LET O=0
 720 IF B>T+(16*33) THEN LET O=1
 750 POKE B,12
 760 IF PEEK (A)=12 THEN GOTO 10
00
 762 IF PEEK (A)=164 THEN GOTO 4
100
 765 IF PEEK (A)=173 THEN GOTO 2
000
 770 IF PEEK (A)=190 THEN LET C=
C+1
 772 IF PEEK (A)=139 THEN GOTO 4
100
 775 IF PEEK (A)=170 THEN GOTO 8
000
 777 IF PEEK (A)=136 THEN GOTO 7
000
 780 GOTO 630
1000 CLS
1001 PRINT AT 16,3,"[SPACE][SPACE][SPACE]  [SPACE][SPACE][SPACE][SPACE]
[SPACE][SPACE][SPACE][SPACE][SPACE]"
1002 PRINT AT 17,3,"[SPACE]  [SPACE]  [SPACE]
[SPACE]  [SPACE]  [SPACE]"
1003 PRINT AT 18,3,"[SPACE]  [SPACE]  [SPACE][SPACE]
[SPACE][SPACE][SPACE][SPACE]"
1004 PRINT AT 19,3,"[SPACE]  [SPACE]  [SPACE]
[SPACE]  [SPACE]  [SPACE]"
1005 PRINT AT 20,3,"[SPACE][SPACE]  [SPACE][SPACE][SPACE][SPACE]
[SPACE]  [SPACE][SPACE]"
1006 FOR D=0 TO 22
1007 FOR J=1 TO 2
1008 NEXT J
1009 SCROLL
1010 NEXT D
1020 CLS
1024 PRINT ,,,,"...CELLS RESCUED
 ";C
1025 IF PEEK 16507<=C THEN POKE
16507,C
1027 PRINT ,,'HIGH SCORE ".PEEK
16507
1028 FOR D=0 TO 100
1030 NEXT D
1032 IF H=1 THEN GOTO 490
1034 PRINT ,,"PLAY AGAIN ?"
1040 INPUT B$
1050 IF B$="Y" THEN RUN
1070 PRINT AT 16,7,"[SPACE][SPACE][SPACE]  [SPACE]  [SPACE]
[SPACE][SPACE][SPACE]"
1080 PRINT AT 17,7,"[SPACE]  [SPACE]  [SPACE]  [SPACE]
[SPACE]"
1090 PRINT AT 18,7,"[SPACE][SPACE]  [SPACE][SPACE][SPACE][SPACE]
[SPACE][SPACE]"
1100 PRINT AT 19,7,"[SPACE]  [SPACE]  [SPACE]
[SPACE]"
1110 PRINT AT 20,7,"[SPACE][SPACE][SPACE][SPACE]  [SPACE]
[SPACE][SPACE][SPACE][SPACE]"
1120 FOR D=0 TO 22
1130 FOR J=1 TO 2
1140 NEXT J
1150 SCROLL
1160 NEXT D
```

```
1165 CLS
1170 STOP
2000 CLS
2010 PRINT "HOME.."
2020 PRINT ,,,"THE PLANET EARTH
 IS GRATEFUL FOR "
2030 PRINT ,,"YOUR HELP    SCORE
 "C
2040 IF C<7 THEN PRINT ,,"OUT YO
U HAVE NOT GOT ENOUGH"
2050 LET H=0
2055 IF C<7 THEN LET H=1
2060 IF C<7 THEN PRINT ,,"SO GAC
K YOU GO TO GET SOME MORE."
2070 GOTO 1025
3000 CLS
3010 PRINT "I,M AFRAID YOUR OUT
OF TIME
3012 PRINT ,,"AND THE DODA SHUT
ON YOU.."
3015 PRINT ,,"TRI MEX CHASED AND
 CRUGHT YOU"
3017 PRINT
3018 FOR D=0 TO 200
3019 NEXT D
3020 GOTO 1000
4000 LET M$="042 012 064 006 023
 043 035 126 254 118 032 003 016
 246 201 198 128 119 024 242"
4010 FAST
4020 FOR M=16514 TO 16533
4030 POKE M,VAL M$( TO 3)
4040 LET M$=M$(5 TO )
4050 NEXT M
4060 RETURN
4100 FOR M=1 TO 30
4110 RAND USR 16514
4115 NEXT M
4120 FOR C=0 TO 50
4130 NEXT D
4140 CLS
4142 IF G=1 THEN GOTO 4240
4145 LET G=1
4147 LET Y=Y+1
4148 IF Y>=8 THEN GOTO 9900
4150 PRINT "H I G H"
4160 PRINT ,,"P O W E R'
4170 PRINT ,,"E U A P E R A T E
R'
4180 PRINT ,,,,"THE EVAPEARTER H
AS DROPPED YO DN"
4190 PRINT ,,"A PLANET CALLED DX
4 , TIME IS "
4200 PRINT ,,"RUNNING LOW HURRY.
TRY AND GET "
4210 PRINT ,,,"BACK TO ZAPHOD...G
O TO A SHUTTLE
4215 PRINT ,,,"THERE IS ALSO A MO
NSTER ON DX4"
4220 PRINT ,,,"      GOOD LUCK"
4225 FOR D=0 TO 100
4227 NEXT D
4230 CLS
4235 LET Z=1
4237 LET F=1
4239 GOTO 490
4240 CLS
4255 PRINT "YOUR AT ...."
4260 PRINT ,,,,"NOW YOU ARE BACK
 ON ZAPHOD YOU"
4270 PRINT ,,"CAN GET BACK TO GE
TTING MORE "
4280 PRINT ,,"CELLS    GOOD LUCK"
4290 LET TI=200
4300 LET G=0
4302 LET F=0
4305 LET Z=0
4307 FOR D=0 TO 100
4309 NEXT D
4310 GOTO 490
7000 CLS
7010 FOR D=0 TO 20
7020 PRINT "[illegible]"
7030 NEXT D
7040 PRINT AT 1,12,"YOU HAVE FA
LLEN"
7050 PRINT AT 3,12," DOWN A CHUT
E"
7060 PRINT AT 5,12," TO THE NEXT
 LEVEL"
7070 PRINT AT 7,12," WHERE YOU W
ILL"
7080 PRINT AT 9,12," HAVE TO FIN
D AN"
7090 PRINT AT 11,12,"ELEVATOR T
O GET"
7100 PRINT AT 13,12,"BACK UP TO
THE"
7110 PRINT AT 15,12," FIRST LEVE
L.."
7120 PRINT AT 17,14,"GOOD LUCK"
7130 LET TI=200
7140 LET F=1
7145 LET Y=Y+1
7150 FOR D=0 TO 20
7160 PRINT AT D,9,CHR$ 23,AT D,9
 CHR$ 0
7170 NEXT D
7172 FOR D=1 TO 200
7174 NEXT D
7175 IF Y>=8 THEN GOTO 9000
7180 GOTO 490
8000 CLS
8010 FOR D=0 TO 20
8020 PRINT "[illegible]"
8030 NEXT D
8040 PRINT AT 1,12," DONE IT..N
OW"
8050 PRINT AT 3,12,"GOING BACK
UP TO"
8060 PPINT AT 5,12," THE FIRST L
EVEL."
8070 PRINT AT 7,12,"GOOD LUCK
"
8080 LET TI=200
8090 LET F=0
8092 FOR D=20 TO 0 STEP -1
8093 PPINT AT D,9,CHR$ 23:AT D,9
 CHR$ 0
8094 NEXT D
8095 FOR D=1 TO 100
8096 NEXT D
8100 GOTO 490
9000 IF G=1 THEN GOTO 9030
9005 FOR D=1 TO 4
9010 PRINT AT INT (RND*17)+1,INT
 (RND*20)+10,CHR$ 170
9020 NEXT D
9025 IF G<>1 THEN GOTO 9040
9030 PRINT AT INT (RND*17)+1,INT
 (RND*30)+1,CHR$ 184
9040 GOTO 625
9800 CLS
9810 PRINT "BECAUSE YOU HAVE FAL
LEN DOWN TOO"
9820 PRINT ,,"MANY CHUTES..TRI H
EX CREPT DOWN"
9830 PRINT ,,,"TO THE NEXT LEVEL
 AND HID UNDER"
9840 PRINT ,,"THE CHUTE YOU CAME
 DOWN AND ATE"
9850 PRINT ,,,"YOU"
9852 FOR D=0 TO 200
9854 NEXT D
9860 GOTO 1000
9900 CLS
9910 PRINT "BECAUSE YOU HAVE BEE
N EVAPERATED"
9920 PRINT ,,"TOO MANY TIMES YOU
R BODY
9930 PRINT ,,"DISINTIGRATED UNDE
R THE STRAIN.."
9940 GOTO 9852
9950 CLEAR
9960 SAVE "DANGER UX"
9970 RUN
```

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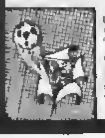
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TAXI! [illegible]

Animation

Get things moving with Duncan Overton's grahics program.

It all began whilst watching some software company's logo reveal itself stripe by stripe on the TV screen. Loading a screen string from tape is a slow operation quite magical and entertaining when first seen but slow. It becomes plain boring when you have to watch that logo everytime you want to give the Alien Menace a good sorting out.

Having loaded a screen string you wish to use, just one misplaced finger and 1's lost needing retrieval from tape (where is that microdrive?). So why not invent a routine to shunt screenfuls into memory and recall them when needed?

This is easy enough to do using PEEK and POKE. PEEKING bytes from address 16384 onwards and POKEing them into higher memory. As there are 6912 screen bytes the process is even slower than loading from tape and Machine Code becomes necessary. For the novice who is only used to BASIC the structure of Code operations seems very obscure. With a little persistence however Code seems to be like any other area of programming easier to learn once you have a specific need to be met. Once the sequence of operations is properly visualised trial and error will get you there in the end. One point soon learnt is that you must tape each program before you RUN it – in Code crashes are invariably fatal!

There are over 40,000 bytes available on the 48K for program and storage space so up to 5 screenfuls could be stored. Program 1 is a Code routine to move 6912 bytes from one starting address to another. In order that this routine can be used and modified easily it may be entered from a DATA statement in BASIC. For this it needs to be written in decimal form. Bytes 2,3 and 5,6 are the addresses which are written in a manner illogical to common mortals. Byte 3 is the number of 256s in the address and byte 2 is the remainder from this division. So address 33000 is 33000/256 which equals 128 remainder 232 and is entered as 232, 128 which the little Z80 chip seems to understand perfectly.

Program 2 is a BASIC routine to enter and run the Code program using specified addresses. The Code is placed at the top end of memory, 64000 to 64020 and is preserved from NEW using line 1000. Screen strings can be stored as low as 25000 in memory provided only a small BASIC program is stored as well. The storage addresses increase by 7000 for each new entry. Enter and RUN the program using addresses 16384 and 25000 and then set up a screen design. ENTER RANDOMIZE USR 64000 and nothing at all will appear to happen. But with the specified addresses the screen is now copied into memory from 25000 to 31912 (PEEK it and see). Clear the screen and RUN the BASIC program again entering address 25000 first and 16384 second. RANDOMIZE USR 64000 again ▶



Photograph courtesy of Walt Disney Productions

and your screenful will return considerably more quickly than using PEEK and POKE. Four further screenfuls can be stored and retrieved in the same way.

So what has all this to do with animation? Well, if the code routine is used to recall screenfuls repeatedly in cycle then interesting possibilities arise. Program 3 uses the Code routine...at line 100 to store 4 designs. These 4 designs are created in lins 7 to 70 and are each slightly different. Lines 200 onwards recall these blocks in cycle continuously and Hey Presto! you have an animated Spectrum.

For those of us used only to BASIC programming it is awe inspiring to calculate that as one revolution of the figures takes about 7 seconds and involves 64 frames then some 63000 bytes are being shunted around each second!

Spinning wheels, wriggly caterpillars travelling waves and rotating solids can all be produced in the same way.



Photograph courtesy of Walt Disney Productions

Program 1

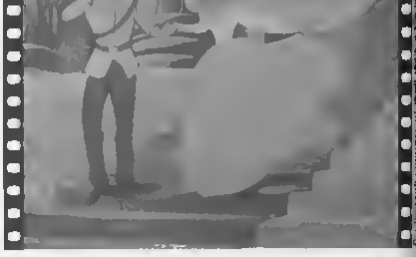
HEX	MNEMONICS	FOR HUMANS
11 XX XX	LD DE address 1	Set read from address
21 XX XX	LD HL address 2	Set load to address
06 1B	LD B 27	Set up a loop of
C5	PUSH BC	6912 repetitions
06 00	LD B 256	
1A	LD A DE	Put contents of add 1
77	LD(HL) A	into add 2
13	INC DE	Move add 1 & add 2
23	INC HL	on to next address
10 F9	DJNZ -6	Other end of
C1	POP BC	loop
10 F4	DJNZ -11	
C9	RET	Return to BASIC

Program 2

```
1000 CLEAR 63999
1010 INPUT "READ FROM" ADDRESS
?";Y
1020 INPUT "STORE TO" ADDRESS ?
";Z
1025 FOR N=64000 TO 64020
1030 READ A: POKE N,A: NEXT N
1035 DATA 17,Y-INT (Y/256)*256,I
NT (Y/256)
1040 DATA 33,Z-INT (Z/256)*256,I
NT (Z/256)
1045 DATA 6,27,197,5,0,26,119,19
,35,16,249,193,16,244,201
1050 PRINT "SET UP, OR RECALL SC
REEN NOW"
```

Program 3

```
  1 REM      STARSPIN
    @ DGOverton 1983
  2 BORDER 0: PAPER 0: BRIGHT 1:
 CLS
  3 OVER 0: CLEAR 63999
  5 LET z=26000: LET d=0
  7 FOR m=1 TO 4
 10 FOR n=0+d TO 2*PI+d STEP PI
/8
 15 INK 6: PLOT 127+127*SIN n,
7+87*COS (n)
 16 INK 6: PLOT 127+127*SIN (n+
PI/100),87+87*COS (n+PI/100)
 17 INK 6: PLOT 127+127*SIN (n+
PI/50),87+87*COS (n+PI/50)
 18 INK 6: PLOT 127+127*SIN (n+
3*PI/100),87+87*COS (n+3*PI/100)
 22 INK 5: PLOT 127+70*SIN -n,8
7+70*COS -n
 25 DRAW 70*(SIN (-n+PI/2)-SIN
-n),70*(COS (-n+PI/2)-COS -n)
 26 INK 2: PLOT 127+35*SIN n,8
+35*COS n
 27 DRAW 35*(SIN (n+PI/2)-SIN
),35*(COS (n+PI/2)-COS n)
 30 NEXT n
 35 GO SUB 100
 40 LET z=z+7000
 50 LET d=d+PI/36
 60 CLS
 70 NEXT m
 92 GO TO 200
100 RESTORE 110: FOR n=64000 TO
64020: READ q: POKE n,q: NEXT n
 RANDOMIZE USR 64000
110 DATA 17,0,64,33,z-INT (z/25
6)*256,INT (z/256),6,27,197,6,0,
26,119,19,35,16,249,193,16,244,2
01
120 RETURN
200 LET z=26000
205 FOR f=0 TO 60 STEP 20
210 RESTORE 220: FOR n=64000+f:
TO 64019+f: READ q: POKE n,q: NE
XT n
220 DATA 17,z-INT (z/256)*256,I
NT (z/256),33,0,64,6,27,197,6,0
26,119,19,35,16,249,193,16,244
230 LET z=z+7000
240 NEXT f
250 POKE 64000,201
300 IF INKEY$="" THEN RANDOMIZE
USR 64000
302 IF INKEY$<>"" THEN GO TO 30
2
304 GO TO 300
```



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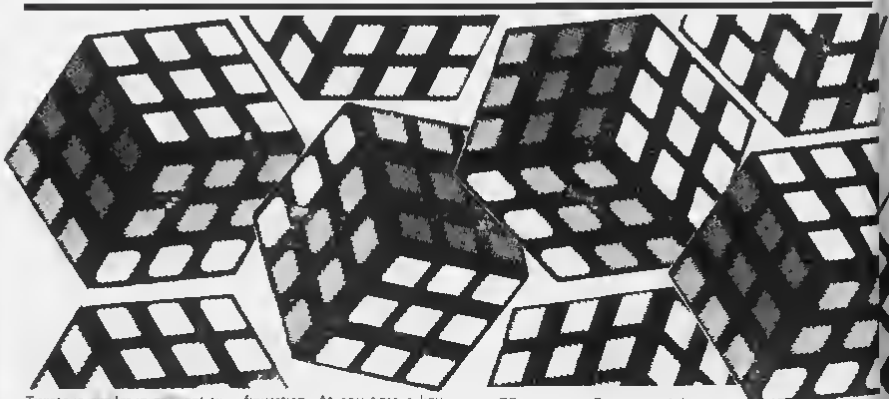
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Twists

A mind bending program from Paul Clansey of Liverpool.



Twists is similar in concept to Rubik's Cube but with a two dimensional four colour sixteen square grid. The squares are shuffled randomly at the start of each game the player then shifting one row or column at a time attempting to return it to its original configuration. At any time a key may be pressed (Q) to check the solution — if it is correct then the time taken will be displayed in seconds. The keys used to manipulate the grid are indicated around its edges. The program is structured as follows:

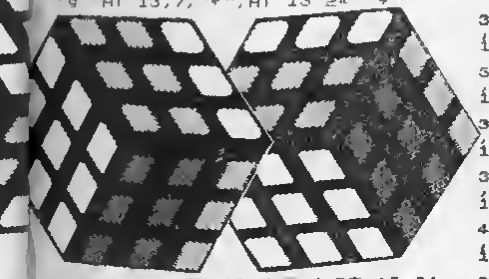
Line 1	REM statement of sufficient characters to hold the machine code routine
2	POKEs data from lines 6 to 8 into above
6-8	DATA for machine code routine which changes attributes within a 2 by 2 character square
10	DATA for the attributes of the sixteen grid squares
11 12	DATA for the USR Graphics (four arrows)
20	Sets up a two dimensional array of the attribute values
21 24	Sets up the USR Graphics (A = ↑ B = ↓ C = ← D = →)
25-60	Sets up the screen display
61 63	Awaits request for another game
64	Random Shift Counter (RSC)
65	Decrements RSC and randomly goes to one of the 16 possible shifts
70 71	Checks to see if Q is pressed
72	Excludes unexpected INKEY$
73	Goes to line number determined by the CODE of INKEY$
76	(After Q is pressed) calculates time taken
76 77	Checks that solution is correct — if not then goes to 80
78	Prints time taken
80 81	Informs of incomplete solution then sets up correctly
100 115	Each line performs one of the 16 possible shifts each effecting four elements of the attribute array
116	If in middle of game goes to 120
117	If performing random shifts goes to 65
118	If last random shift just executed sets to the current time
120	POKEs attribute value and Line and Column number of the top left hand character square in each of the sixteen grid squares into the machine code routine executing each in turn

Variable Names

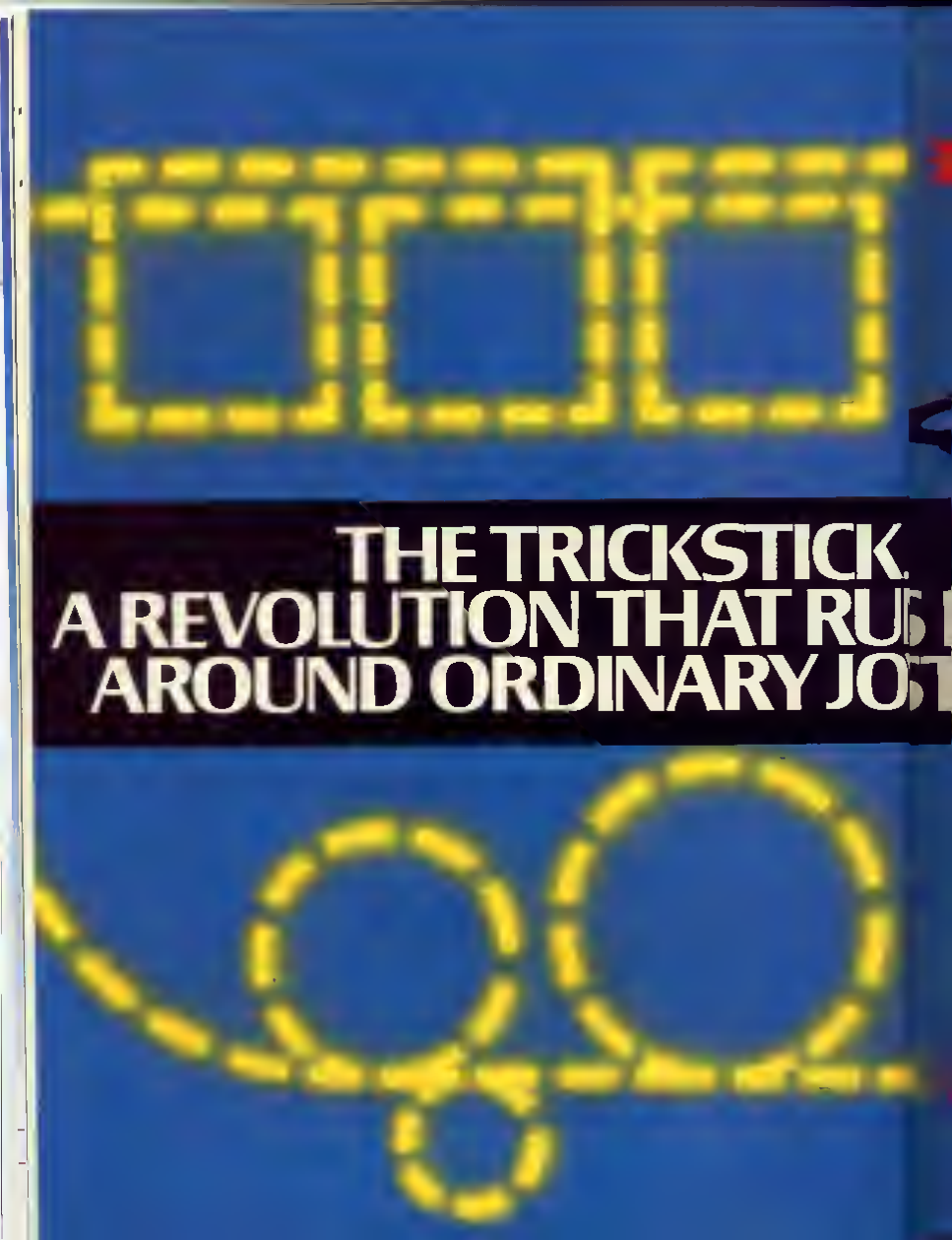
Array	a(x,y)	x and y from 1 4 are the grid row and column numbers. Elements of the array are Attribute values for each grid square
	fg	Number of random shifts to be executed
	t	Time in seconds
	v	Temporary location for first array element in each shift execution

```
   1 REM xxxxxxxxxxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
   2 FOR n=23760 TO 23803  READ
a: POKE n,a  NEXT n
   5 RANDOMIZE  DIM a(4,4)
   6 DATA 62,64,1,0,0,17,4,4,33,
223,67,213,17,32,0,4,25,16,253
   7 DATA 66,4,35,16,253,209,66,
229,72,67,119,56,16,252,225,213
   8 DATA 17,32,0,25,209,65,16,2
39,201
```

```
  10 DATA 16,16,48,48,16,16,48,4
8,32,32,8,8,32,32,8,8
  11 DATA 0,8,28,42,8,8,0,0,0,0,
8,8,42,28,8,0
  12 DATA 0,16,32,124,32,16,0,0,
0,8,4,62,4,8,0,0
  20 FOR y=1 TO 4: FOR x=1 TO 4:
READ z: LET a(x,y)=z: NEXT x: N
EXT y
  21 FOR f=0 TO 7: READ z: POKE
USR "A"+f,z: NEXT f
  22 FOR f=0 TO 7: READ z: POKE
USR "B"+f,z: NEXT f
  23 FOR f=0 TO 7: READ z: POKE
USR "C"+f,z: NEXT f
  24 FOR f=0 TO 7: READ z: POKE
USR "D"+f,z: NEXT f
  25 BORDER 0: PAPER 5: CLS
  26 PRINT AT 3,9,"a"+"b"+"c"+"d
"+"e",AT 19,9,"i"+"k"+"j"+"i"
  27 PRINT AT 4,7,"p",AT 4,24,"e
",AT 8,7,"+",AT 5,24,"+"
  28 PRINT AT 8,7,"o",AT 8,24,"f
",AT 9,7,"+",AT 9,24,"+"
  29 PRINT AT 12,7,"n",AT 12,24,
"g",AT 13,7,"+",AT 13,24,"+"
```



```
  30 PRINT AT 16,7,"m",AT 16,24,
"h",AT 17,7,"k",AT 17,24,"+"
  31 FOR n=3 TO 18: PRINT PAPER
2,AT n,6," ": PAPER 6: NEXT n: FOR m=11 TO 18
: PRINT PAPER 4;AT m,6," ": PAPER 1: NEXT m
  40 PLOT 64,151: DRAW 191-64,0
: DRAW 0,24-151: DRAW 64-191,0: D
RAW 0,151-24
  50 PLOT 64,87: DRAW 191-64,0:
PLOT 64,55: DRAW 191-64,0: PLOT
64,238/2: DRAW 191-64,0
  55 PRINT AT 10,28,"PAPER 2;" "
;PAPER 6;" ";AT 11,28,"PAPER 4;
" ";PAPER 1;" "
  60 PLOT 127,151: DRAW 0,24-151
: PLOT 96,151: DRAW 0,24-151: PL
OT 159,151: DRAW 0,24-151
  61 PRINT AT 0,0,"PRESS ANY KE
Y TO PLAY.."
  63 IF INKEY$="" THEN GO TO 62
  64 PRINT AT 0,0,"                ": LET fg=30
  65 LET fg=fg-1: GO TO INT (RND
*16+97)
  70 IF INKEY$="" THEN GO TO 69
  71 IF INKEY$="q" THEN GO TO 76
  72 IF CODE INKEY$<97 OR CODE I
NKEY$)112 THEN GO TO 70
  73 GO TO ((CODE INKEY$)+3)
  75 RESTORE 10: LET t=(256*256+
PEEK 23674+256*PEEK 23673+PEEK 2
3672)/50-t
  76 FOR y=1 TO 4: FOR x=1 TO 4:
READ z: IF z<>a(x,y) THEN GO TO
80
  77 NEXT x: NEXT y
  78 PRINT AT 21,0,"                ": PRINT FLA
SH 1;AT 21,10,"TIME  ";t: GO TO
61
  80 PRINT AT 21,0,"                ": PRINT FLA
SH 1;AT 21,10,"INCOMPLETE"
  81 FOR n=1 TO 700: NEXT n: RES
TORE 10: GO TO 20
 100 LET v=a(1,1): LET a(1,1)=a(
1,2): LET a(1,2)=a(1,3): LET a(1
,3)=a(1,4): LET a(1,4)=v: GO TO
116
 101 LET v=a(2,1): LET a(2,1)=a(
2,2): LET a(2,2)=a(2,3): LET a(2
,3)=a(2,4): LET a(2,4)=v: GO TO
116
 102 LET v=a(3,1): LET a(3,1)=a(
3,2): LET a(3,2)=a(3,3): LET a(3
,3)=a(3,4): LET a(3,4)=v: GO TO
116
 103 LET v=a(4,1): LET a(4,1)=a(
4,2): LET a(4,2)=a(4,3): LET a(4
,3)=a(4,4): LET a(4,4)=v: GO TO
116
 104 LET v=a(4,1): LET a(4,1)=a(
3,1): LET a(3,1)=a(2,1): LET a(2
,1)=a(1,1): LET a(1,1)=v: GO TO
116
 105 LET v=a(4,2): LET a(4,2)=a(
3,2): LET a(3,2)=a(2,2): LET a(2
,2)=a(1,2): LET a(1,2)=v: GO TO
116
 106 LET v=a(4,3): LET a(4,3)=a(
3,3): LET a(3,3)=a(2,3): LET a(2
,3)=a(1,3): LET a(1,3)=v: GO TO
116
 107 LET v=a(4,4): LET a(4,4)=a(
3,4): LET a(3,4)=a(2,4): LET a(2
,4)=a(1,4): LET a(1,4)=v: GO TO
116
 108 LET v=a(4,4): LET a(4,4)=a(
4,3): LET a(4,3)=a(4,2): LET a(4
,2)=a(4,1): LET a(4,1)=v: GO TO
116
 109 LET v=a(3,4): LET a(3,4)=a(
3,3): LET a(3,3)=a(3,2): LET a(3
,2)=a(3,1): LET a(3,1)=v: GO TO
116
 110 LET v=a(2,4): LET a(2,4)=a(
2,3): LET a(2,3)=a(2,2): LET a(2
,2)=a(2,1): LET a(2,1)=v: GO TO
116
 111 LET v=a(1,4): LET a(1,4)=a(
1,3): LET a(1,3)=a(1,2): LET a(1
,2)=a(1,1): LET a(1,1)=v: GO TO
116
 112 LET v=a(1,4): LET a(1,4)=a(
2,4): LET a(2,4)=a(3,4): LET a(3
,4)=a(4,4): LET a(4,4)=v: GO TO
116
 113 LET v=a(1,3): LET a(1,3)=a(
2,3): LET a(2,3)=a(3,3): LET a(3
,3)=a(4,3): LET a(4,3)=v: GO TO
116
 114 LET v=a(1,2): LET a(1,2)=a(
2,2): LET a(2,2)=a(3,2): LET a(3
,2)=a(4,2): LET a(4,2)=v: GO TO
116
 115 LET v=a(1,1): LET a(1,1)=a(
2,1): LET a(2,1)=a(3,1): LET a(3
,1)=a(4,1): LET a(4,1)=v: GO TO
116
 116 IF fg=0 THEN GO TO 120
 117 IF fg>1 THEN GO TO 65
 118 LET fg=0: PRINT AT 21,0,"P
ress 'P' to stop clock.": LET t=
(256*256*PEEK 23674+256*PEEK 236
73+PEEK 23672)/50
 120 FOR y=1 TO 4: FOR x=1 TO 4:
POKE 23759+x+y,a(x,y): POKE 23763,a
*4+(x-1): POKE 23764,3+4*(y-1):
LET q=USR 23760: NEXT x: NEXT y
 125 GO TO 70
```


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USE THE COUPON OR THE PHONE Trickstick and Attaktics are in stock and available now. Trickstick including interface is £28. Attaktics is £7.50 if ordered with a Trickstick and £10 on its own. The Programmable Adaptor is £10 for Trickstick owners and £15 for others. The Training Tape is Free with each Trickstick. Or call us for the name of your local stockist.

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EAST LONDON ROBOTICS

Asteroid adventure

Suspense in space with Roger Ditchburn of Whitby and his ZX81.



This program for your ZX81 is divided into three parts, Asteroid Storm, the Tunnel and lastly the Hall of Fame

The first section (giving away a lot in its title) Asteroid Storm places you in a space ship in the middle of an asteroid storm trying to shoot at a space ship travelling from the top to the bottom of the screen. You move your own ship with the '5' and '8' keys to move left and right respectively you can fire at the ship using the F key.

A light touch on the keys will move your ship only one square at a time, whilst if you press hard the ship will move two squares at a time — so be careful!

And the rest . . .

The second part of the program involves your ship travelling through a tunnel with a gate at the end. Your task is to enter the gate — but you must make sure that your ship does not collide with any of the black squares surrounding the gate. You get to move your ship up and down using the '6' and '7' keys respectively. If you manage to get a good score on the first section you may find that the gate becomes smaller and so your task is that bit harder.

The final part of the program is the Hall of Fame. This prints the top ten scores with the names of the people who scored them (the names must be less than ten letters long). The names are, of course, listed so that the highest scores are at the top of the list.

Good luck — you'll need it.

```
  3 DIM Z$(10,10)
  4 DIM Z(10)
  5 FOR F=1 TO 10
  6 LET Z$(F)="----------"
  7 LET Z(F)=0
  9 NEXT F
 12 LET SC=100
 20 LET A$=" "
 30 LET DA=5
 50 LET B$="+"
 80 LET R=INT (RND*30)+1
 90 PRINT "ASTEROID STORM
100 FOR F=1 TO 21
200 PRINT AT F,R,A$
210 PRINT AT F-1,R,""
250 PRINT AT 20,DA,B$
255 PRINT AT 20,DA,""
260 LET DA=DA+(INKEY$="8")-(INK
EY$="5")
350 LET DR=DR+(INKEY$="8")-(INK
EY$="5")
400 PRINT AT 20,DA,B$
450 IF R=DA AND INKEY$="F" THEN
GOTO 600
500 NEXT F
505 LET SC=SC-20
510 PRINT AT 0,0,"YOU""RE DEAD-
TRY AGAIN"
515 IF SC<=0 THEN GOTO 1100
520 CLS
530 GOTO 30
600 FOR V=20 TO F STEP -1
602 PRINT AT V,R,""
603 NEXT V
604 PRINT AT V,R,"<>"
605 FOR D=0 TO 21
606 PRINT AT D,0,""
607 NEXT D
612 LET SC=SC+100
614 PRINT AT 0,16,"SCORE= " SC
615 REM **TUNNEL**
620 LET W=PEEK 16396+256*PEEK 1
6397+1
630 FOR F=21 TO 0 STEP -1
640 PRINT AT F,0,"          "
650 NEXT F
651 FOR F=10 TO 14
652 PRINT AT F,0,"■
                  ■"
653 NEXT F
655 PRINT AT 14 INT (RND*5)+10,
CHR$ 128
657 PRINT AT 13,INT (RND*5)+15
CHR$ 128
660 LET RRR=INT (RND*21)
670 LET RRRR=INT (RND*4)+10
690 FOR F=1 TO SC/200
692 LET R=INT (RND*25)+2
694 LET RR=INT (RND*4)+10
696 PRINT AT RR,R,CHR$ 128
697 IF RR=RRRR THEN PRINT AT RR
RRR,""
698 PRINT AT RRRR,RRR,"■"
699 POKE W+495+RR,128
705 PRINT AT RR+1,R,CHR$ 128
708 PRINT AT RR-1,R+INT (RND*3)
■
710 NEXT F
711 PRINT AT 13,1,"■          ■",AT
11,7,"
715 PRINT AT 12,29,"■" AT 13,29
■
717 IF SC>1000 THEN PRINT AT 13
,29,"■"
720 LET M=W+431
730 IF PEEK M<>0 THEN GOTO 1000
740 POKE M,CODE 0$
745 POKE M-1,0
750 LET M=M+1
760 LET M=M+33*(INKEY$="6")-33*
(INKEY$="7")
890 LET SC=SC+1
900 GOTO 725
999 IF PEEK M<>CODE " " THEN GO
TO 1100
1004 IF SC<=0 THEN GOTO 9980
1005 IF PEEK M<>CODE " " THEN GO
TO 1100
1007 NEXT D
1015 LET SC=SC+150
1016 FOR F=10 TO 14
1017 PRINT AT F,0,"■
                  ■"
1018 NEXT F
1019 GOTO 660
1020 PRINT AT 20,0," SCORE= ",SC
"
1030 FOR F=1 TO 75
1040 NEXT F
1100 REM **HALL OF FAME**
1101 FOR D=1 TO 10
1102 POKE M,CODE E$
1103 POKE M,CODE "■"
1105 NEXT D
1109 FOR F=1 TO 21
1110 PRINT AT F,0,""
1120 NEXT F
1125 PRINT AT 0,13,"SCORE=",SC
1130 IF SC>Z(10) THEN GOSUB 2000
1140 PRINT AT 3,0,"  THE HALL OF
                  FAME"
1150 FOR F=1 TO 10
1160 PRINT AT F+6,2,Z$(F),AT F+6
,13,Z(F)
1170 NEXT F
1175 IF INKEY$="" THEN GOTO 1170
1179 CLS
1180 LET SC=100
1181 GOTO 20
2000 PRINT AT 0,0,"    YOUR SCOR
E IS IN THE TOP TEN"
2020 PRINT "WELCOME TO THE HALL
OF FAME"
2030 FOR F=1 TO 10
2040 IF SC>Z(F) THEN GOTO 2100
2050 NEXT F
2100 PRINT " INPUT YOUR NAME"
2200 FOR N=10 TO F+1 STEP -1
2210 LET Z$(N)=Z$(N-1)
2220 LET Z(N)=Z(N-1)
2250 NEXT N
2251 INPUT Z$(F)
2260 LET Z(F)=SC
5000 RETURN
5020 NEXT F
```

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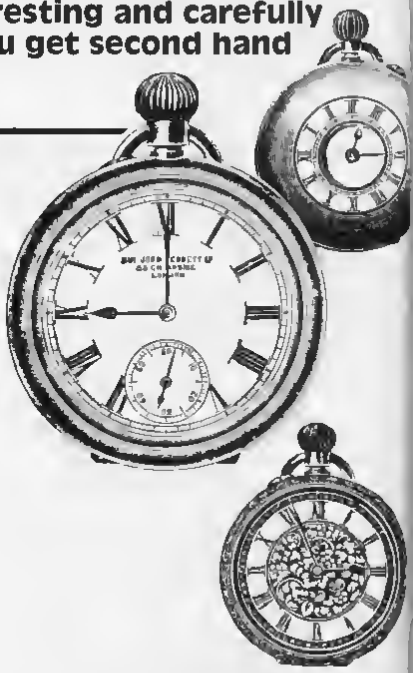
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Time out

Turn your Spectrum into an expensive and rather bulky wristwatch. An interesting and carefully designed program that you get second hand from Douglas Richardson of Edinburgh.



Chapter 18 of the Spectrum manual describes two analogue clock programs the first version uses PAUSE as the hairspring but as the manual says there is a difference of 1/50 between consecutive PAUSE numbers equivalent to half an hour per day. By altering the PAUSE velue you could probably increase the accuracy.

This program prints out a digital watch and as the result is displayed as a number setting and synchronising are much easier — the PAUSE is compounded to give this accuracy. The performance of the watch then is dependent more on the stability of the timing delay function on the computer rather than the ultimate accuracy of the internal clock.

The PAUSE at line 110 is the main reference. It allows a slight gain which is essential if a following PAUSE is to be corrective.

Calibration

With PAUSE 49 at line 110 and REMs at 135 and 153 (see setting) run the watch for one hour. Seconds gained per hour times 5/6 rounded to the nearest integer gives you the PAUSE to be entered at line 135 in place of the REM. You must round down if you intend to use a third PAUSE for maximum accuracy. In the author's first check the gain was five seconds per hour.

5 x 5/6 = 4.16667

PAUSE 4 was then used at line 135.

```
  7 REM ***DIGITAL WRIST WATCH
 10 REM ************************
 15 REM              D.Richardson
 20 REM ************************
 30 GO SUB 250
 39 REM ************************
 40 REM                Set time
 41 REM ________________________
 45 IF  INKEY$ <> "" THEN  GO TO 45
 50 IF  INKEY$ ="" THEN  GO TO 50
 55 IF  INKEY$ ="h" THEN  PRINT  AT 10,17;h+1: LET h=h+1: IF h>12 THEN  LET h=
: PRINT h$;"1 ": GO TO 45
 60 IF  INKEY$ ="m" THEN  PRINT m$;m+1: LET m=m+1: IF m>59 THEN  LET m=0: PRINT
 m$;"0 ": GO TO 45
 65 IF  INKEY$ ="s" THEN  PRINT s$;s+5: LET s=s+5: IF s>59 THEN  LET s=0: PRINT
 s$;"0 ": GO TO 45
 70 IF  INKEY$ <"p" THEN  LET r$="PM": PRINT a$;r$: GO TO 45
 75 IF  INKEY$ ="a" THEN  LET r$="AM": PRINT a$;r$: GO TO 45
 80 IF  INKEY$ <> "g" THEN  GO TO 45
 85 FOR n=0 TO 11: PRINT  AT n,0;"                ": NEXT n
 90 PRINT  AT 15,2;"As ""TIME""": PRINT  AT 16,5;"goes by"
 99 REM ************************
100 REM               Clockworks
```

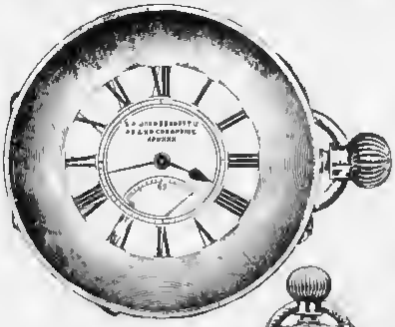
If you opt for maximum precision then with PAUSEs entered at lines 110 and 135 and a REM at line 153 run the clock over a much greater length of time. Seconds gained per hour x50 will give you the PAUSE value to be entered.

Looking back to the author's example the third PAUSE was not necessary as the error was only two minutes per day with one PAUSE and 48 seconds per day with two PAUSEs. However your Spectrum may be different and require this fine tuning.

Subject to stability, the target accuracy should be 24/50 seconds per 24 hours. This would give you an error of one minute per 500 days!

Setting

For ease of setting the seconds increment by five but run normally once set. Set the time with the seconds just ahead of real time then press G when the time is correct. Note line 730 Graphics is 1' Date is for effect only and may be changed at line 400.





```
110 PAUSE 49
120 LET s=s+1
130 IF s<60 THEN  PRINT a$;s: GO TO 110
135 REM ANOTHER PAUSE? SEE TEXT
140 LET s=0: PRINT a$;"0 '
145 LET m=m+1: IF m<60 THEN  PRINT m$;m' GO TO 110
153 REM FURTHER PAUSE? SEE TEXT
155 LET m=0: PRINT m$;"0 "
160 LET h=h+1: IF h<12 THEN  PRINT h$;h: GO TO 110
165 IF h=12 THEN  PRINT h$;h: GO TO 195
170 IF h=13 THEN  LET h=0: PRINT h$;" 1": GO TO 110
195 IF r$="AM" THEN  LET r$="PM": PRINT a$;r$: GO TO 110
200 IF r$="PM" THEN  LET r$="AM": PRINT a$;r$: GO TO 110
244 REM ************************
245 REM              Build Watch
250 LET h=0: LET m=0: LET s=0
255 BORDER 0
260 LET h$= CHR$ 22+ CHR$ 10+ CHR$ 17
270 LET m$= CHR$ 22+ CHR$ 10+ CHR$ 20
280 LET a$= CHR$ 22+ CHR$ 10+ CHR$ 23
285 PRINT h$;h,m$;m,a$;s
290 LET r$="AM"
295 LET a$= CHR$ 22+ CHR$ 14+ CHR$ 17: PRINT a$;r$
300 PRINT  AT 0,0;"To set PRESS": PRINT " H for hours": PRINT " M  -  mins": PR
INT " S  -  secs": PRINT " AorP-AM/PM": PRINT ""    To START": PRINT "   PRESS 'G
'": PRINT ''' (Stopwatch": PRINT "     only"0"")"
350 PRINT  AT 12,17;"Hr"; AT 12,20;"Mn"; AT 12,23;"Sc"
400 PRINT  AT 14,21;"SA19"
500 PRINT  AT 7,18;"ASEIKO"
510 PRINT  AT 16,18;"Quartz"
520 PLOT 143,128: DRAW 0,-97,.72* PI
530 PLOT 192,31: DRAW 0,97,.72* PI
540 PLOT 143,175: DRAW 0,-51: DRAW 0,-89,.67* PI : DRAW 0,-35
550 PLOT 192,0: DRAW 0,35: DRAW 0,89,.67* PI : DRAW 0,51
560 FOR y=0 TO 35 STEP 5: PLOT 143,y: DRAW 49,0: NEXT y
570 FOR y=124 TO 175 STEP 5: PLOT 143,y: DRAW 49,0: NEXT y
580 PLOT 203,99: DRAW 0,-15: DRAW -71,0: DRAW 0,15: DRAW 71,0
590 PLOT 128,105: DRAW 79,0: DRAW 0,-51: DRAW -79,0: DRAW 0,51
700 FOR n=0 TO 7
710 READ a
720 POKE  USR "1"+n,a: NEXT n
730 PRINT  AT 12,28;"L"
740 RETURN
750 DATA 248,8,8,248,0,0,0,0
```



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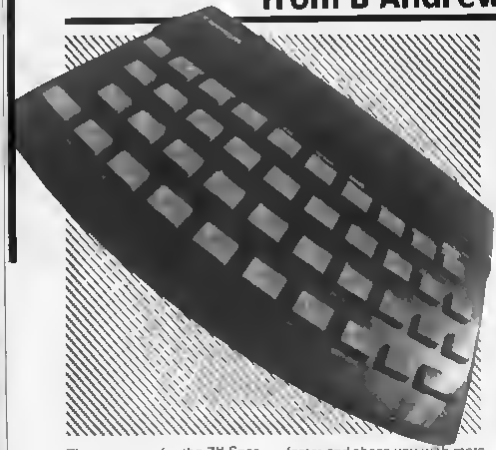
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ATARISOFT™

Rock fall

Watch out for the falling rocks in this Spectrum game from B Andrews of Charlton.



This is a game for the ZX Spectrum which follows the general chase theme. Although written in BASIC and so not up to arcade game speed the game is fun to play and should provide a springboard for you to improve upon it.

The idea of the game is that you manoeuver your character around the rocks trying to gather the six tokens which are scattered around the playing area. It's not quite as easy as it sounds as you are being chased by a number of ghouls intent on stopping you fulfilling your quest. There are nine levels of play, level nine being the easiest and perhaps the level you should start at when you first get to grips with the game. As you might have guessed as you go up in level so the ghouls become faster and chase you with more fervour.

Once you have collected all six tokens you move automatically to the next level and the game begins again complete with another six tokens for you to collect. Extra points can be gained by manoeuvering your character so that a rock falls on a following ghoul – not too easy but with a bit of practice it can be done!

The game includes a high score readout once you have either cleared all nine levels or failed in your task.

Too many variables?

Here is a general guide to the variables used throughout the program.

Z, Q, G and S	General variables
X and Y	The position of your character
X(G) and Y(G)	The position of the ghouls
SCORE	The score
HS	The highest score so far
C	The number of tokens collected by your character
SK	The skill level you have chosen
GHOUL	The level of the ghouls arranged to chase you
S$ and Z$	General reply variables

Line by line

Here follows a brief breakdown of the program.

Lines 10-70	Hold the user defined graphics
Lines 90-290	Set the screen display
Line 300	Sets the variables
Line 310	Prints the scores and sets the level
Lines 320-360	Await the keyboard inputs
Lines 370-400	Update the score and print the man
Lines 410-440	Ask you if you would like to play another game or not
Lines 450-480	Ask you for your skill factor ie which level you would like to start on
Lines 490-590	Move the ghouls and test whether or not the ghouls have caught up with you
Lines 610-760	Contain the subroutines which move your character
Lines 770-880	Contain the subroutine which makes the rock fall should your character pass underneath
Lines 900-910	Print the rock as it falls on your character's head
Lines 930-1180	Give you the instructions for playing the game
Lines 1190-1300	Contain the subroutine for a rock falling on a ghoul's head
Lines 1310-1400	Contain the 'finish game' subroutine and the subroutine which works out your final rank
Lines 1410-1500	Contain the 'live or die?' subroutine should a rock fall on you character's head
Lines 1510-1820	Contain the 'death' subroutine
Lines 1830-2030	Contain the subroutine which sorts the game out once you have finished a level

```
  10 DATA 24,24,255,60,60 36,36
36,12,30,62,127,255,127,62,28,3
,90,153,90,60,24 20.66.24.60.90
126,255,255,219,219
  20 DATA 0,0,219,219,255,255,2
4 219,255,195,165,153,153,165,1
3,255
  30 LET hs=0
  40 FOR z=USR "A" TO USR "G"-1
  50 READ g
  60 POKE z,g
  70 NEXT z
  80 GO SUB 930
  90 LET score=0
 100 BORDER 4  PAPER 7  INK 4
-5
 110 PRINT
 120 FOR z=2 TO 20
 130 PRINT AT z,1;
 140 BEEP .01-z
 150 NEXT z
 160 LET d=20
 170 IF sf<=2 THEN LET d=16
 180 FOR z=1 TO d
 190 LET r=INT (RND*19)+1  LET
=INT (RND*29)+1
 200 LET r1=INT (RND*19)  LET p
=INT (RND*29)+1
 210 IF r<=1 OR r>=21 OR p<=1 O
 p>=31 OR r1<=1 OR r1>=21 OR p1
=1 OR p1>=31 THEN NEXT z
 220 PRINT AT r,p, INK 2, PAPER
4,"0";AT r1,p1, INK 2, PAPER 4
```

```
230 BEEP .01,10
240 NEXT z
250 INK 3: CLS: DRAW 0,167: DRAW 255
,0: DRAW 0,-167: DRAW -255,0
260 FOR z=1 TO 5
270 LET g=INT (RND*26)+1
280 PRINT AT INT (RND*20)+2,g,
"K 5, PAPER 4,"F"
290 NEXT z
300 DIM x(4): DIM y(4): LET x(3
)=7: LET y(3)=18: LET x(4)=19: L
ET y(4)=7: LET c=0: LET ghoul=0
LET x(1)=16: LET y(1)=20: LET x
(2)=4: LET y(2)=20: LET x=3: LET
 s=2
310 PRINT AT 0,0,"score= ";score
AT 0,17,"high score=";hs;AT 0,1
level ";sk
320 IF INKEY$="8" THEN GO SUB 6
30
330 IF INKEY$="h" THEN PAUSE 0
340 IF INKEY$="5" THEN GO SUB 6
30
350 IF INKEY$="7" THEN GO SUB 6
30
360 IF INKEY$="6" THEN GO SUB 7
30
370 LET ghoul=ghoul+1
380 IF ATTR (x,y)=60 THEN LET s
core=score+1
390 PRINT AT 0,6,score
400 PRINT AT x,y; INK 0, PAPER
4; "P": BEEP .01,39
410 IF c>=6 THEN GO TO 1830
420 IF ATTR (x-1,y-1)=34 OR ATT
R (x-1,y-1)=98 AND ATTR (x,y-1)=
124 THEN GO SUB 770
430 IF ATTR (x-1,y+1)=34 OR ATT
R (x-1,y+1)=98 AND ATTR (x,y+1)=
124 THEN GO SUB 930
440 IF ATTR (x-2,y)=34 OR ATTR
(x-2,y)=98 THEN GO SUB 890
450 LET s=s+5
460 IF s<=2 THEN LET s=2
470 IF s>ghoul THEN GO TO 320
480 LET ghoul=0
490 FOR g=1 TO 4
500 PRINT AT x(g),y(g), INK 4,
"M"
510 IF x>x(g) AND ATTR (x(g)+1
,y(g))=60 OR ATTR (x(g)+1,y(g))=3
2 THEN LET x(g)=x(g)+1: GO TO 53
0
520 IF x<x(g) AND ATTR (x(g)-1,
y(g))=60 OR ATTR (x(g)-1,y(g))=3
2 THEN LET x(g)=x(g)-1
530 IF y>y(g) AND ATTR (x(g),y(
g)+1)=60 OR ATTR (x(g),y(g)+1)=3
2 THEN LET y(g)=y(g)+1: GO TO 58
0
540 IF y<y(g) AND ATTR (x(g),y(
g)-1)=60 OR ATTR (x(g),y(g)-1)=3
2 THEN LET y(g)=y(g)-1
550 IF x(g)=x AND y(g)=y THEN
SUB 1510
560 IF x(g)>20 OR x(g)<0 THEN L
ET x(g)=ABS x(g)-1
570 IF y(g)>30 OR y(g)<1 THEN L
ET y(g)=ABS y(g)-1
580 PRINT AT x(g),y(g), PAPER 4
; INK 1;"D"
590 NEXT g
600 GO TO 320
610 PRINT AT x,y, INK 4, BRIGHT
1;"■"
620 IF ATTR (x,y+1)=38 THEN LET
 y=y+1: LET c=c+1: LET score=sco
re+20: BEEP .05,20: BEEP .05,10
BEEP .1,12: RETURN
630 IF ATTR (x,y+1)=100 OR ATTR
 (x,y+1)=60 OR ATTR (x,y+1)=124
THEN LET y=y+1: RETURN
640 RETURN
650 PRINT AT x,y, INK 4, BRIGHT
1;"■"
660 IF ATTR (x,y-1)=38 THEN LET
 y=y-1: LET c=c+1: LET score=sco
re+20: BEEP .05,20: BEEP .05,10
BEEP .1,12: RETURN
670 IF ATTR (x,y-1)=100 OR ATTR
 (x,y-1)=60 OR ATTR (x,y-1)=124
THEN LET y=y-1: RETURN
680 RETURN
690 PRINT AT x,y, INK 4, BRIGHT
1;"■"
700 IF ATTR (x-1,y)=38 THEN LET
 x=x-1: LET c=c+1: LET score=sco
re+20: BEEP .05,20: BEEP .05,10
BEEP .1,12: RETURN
710 IF ATTR (x-1,y)=100 OR ATTR
 (x-1,y)=60 OR ATTR (x-1,y)=124
THEN LET x=x-1: RETURN
720 RETURN
730 PRINT AT x,y, INK 4, BRIGHT
1;"■"
740 IF ATTR (x+1,y)=38 THEN LET
 x=x+1: LET c=c+1: LET score=sco
re+20: BEEP .05,20: BEEP .05,10
BEEP .1,12: RETURN
750 IF ATTR (x+1,y)=100 OR ATTR
 (x+1,y)=124 OR ATTR (x+1,y)=60
THEN LET x=x+1: RETURN
760 RETURN
770 FOR z=x TO 21
780 IF ATTR (z,y-1)=124 THEN PR
INT AT z,y-1; PAPER 4; INK 2;"■"
AT z-1,y-1; INK 4; BRIGHT 1;"■"
: BEEP .01,z: GO TO 800
790 RETURN
800 IF ATTR (z+1,y-1)=33 OR AT
R (z+1,y-1)=37 THEN GO SUB 1190
810 NEXT z
820 RETURN
830 FOR z=x TO 21
840 IF ATTR (z,y+1)=124 THEN PR
INT AT z,y+1; PAPER 4; INK 2;"■"
AT z-1,y+1; INK 4; BRIGHT 1;"■"
: BEEP .01,z: GO TO 860
850 RETURN
860 IF ATTR (z+1,y+1)=33 OR AT
R (z+1,y+1)=37 THEN GO SUB 1250
870 NEXT z
880 RETURN
890 REM
900 IF ATTR (x-1,y)<>60 AND RND
<.07 THEN PRINT AT x-1,y,"B";AT
x-2,y, INK 4,"■";AT x,y, INK 2,
BRIGHT 1,"C": GO SUB 1410
910 RETURN
920 STOP
930 PAPER 7: BORDER 7: CLS: PR
INT AT 0,10,"ROCK-FALL"
940 PRINT AT 4,10,"COPYRIGHT"
950 PRINT " ";"© BRIAN ANDREWS
JUNE 1982"
960 LET new=1: GO TO 1950
970 BORDER 7: PAPER 7: INK 0: C
LS
980 PRINT AT 0,10, INK 2,"ROCK-
FALL"
990 PRINT "The object of the g
ame is to"
1000 PRINT "  pick up 6 of the "
symbols"
1010 PRINT "at each level witho
ut being"
1020 PRINT "  caught by the O gr
ouls."
1030 PRINT "  You are the A sym
bol"
1040 PRINT "Use the cursor keys
 to move"
1050 PRINT "your man around the
 scenario."
1060 PRINT "You score extra po
ints if you"
1070 PRINT "make a rock B land
```

```
ph a ghoul"
1080 PRINT ' 'You can trap the gh
ouls because'
1090 PRINT '  they cant cross you
r path or'
1100 PRINT '  manouvre around the
 boulders'
1110 PRINT ' 'BEWARE of falling
boulders!!!!'
1120 PRINT  'Enter your skill le
vel(1 TO 9)
1130 LET s$=INKEY$
1140 IF s$=""  THEN GO TO 1130
1150 IF CODE s$>57 OR CODE s$<49
 THEN GO TO 1130
1160 LET sk=CODE s$-48
1170 LET new=0
1180 RETURN
1190 PRINT AT z+1,y-1, INK 7, PA
PER 4,"E"
1200 FOR z=0 TO 10  FOR q=25 TO
 1 STEP -(RND*4)-1
1210 BEEP .1,z  BEEP .1,q
1220 NEXT q  NEXT z
1230 LET score=score+100
1240 RETURN
1250 PRINT AT z+1,y+1, INK 7, P
PER 4,"E"
1260 FOR z=0 TO 10  FOR q=25 TO
 1 STEP -RND*7+1
1270 BEEP .1,z  BEEP .1,q
1280 NEXT q  NEXT z
1290 LET score=score+100
1300 RETURN
1310 PAUSE 80
1320 PRINT 'WELL DONE!! You have
 completed'
1330 PRINT ' level 0 and have s
cored  ;score
1340 IF score>hs THEN LET hs=sco
re  PRINT 'which is the highest
 score today'
1350 IF score<1500 THEN LET d$=
"Amateur"
1360 IF score>1500 AND score<250
0 THEN LET d$="Semi-skilled"
1370 IF score>2500 THEN LET d$=
"Skilled"
1380 IF score>3000 THEN LET d$=
"Professional"
1390 PRINT ''  Your ranking is
 ";d$
1400 GO TO 1770
1410 LET die=0  LET live=0
1420 FOR z=1 TO 25 STEP INT (RN
D*5)+1
1430 BEEP .1,z
1440 LET rand=RND*10
1450 IF rand>=6 THEN LET die=die
+1  NEXT z
1460 LET live=live+1
1470 NEXT z
1480 IF die>live THEN GO TO 1510
1490 PRINT AT x,y+1,"A",AT x,y,
PAPER 4, INK 2,"B";AT x-1,y, BRI
GHT 1  INK 4,"■"
1500 LET y=y+1  RETURN
1510 BORDER 7  CLS  PRINT AT 0,
2, FLASH 1, INK 2,"YOU ARE"
1520 FOR z=5 TO 10  BEEP .01,z
PRINT AT z,3, INK 2,"■"  NEXT z
1530 PRINT AT 5,5, INK 2,"■"
1540 PRINT AT 6,6, INK 2,"■"
1550 LET dt=4
1560 PRINT AT 9,6, INK 2,"■"
1570 PRINT AT 10,5, INK 2,"■"
1580 FOR z=4 TO 6  LET dt=dt+1
PRINT AT dt,z, INK 2,"■"  BEEP .
01,dt  NEXT z
1590 FOR z=6 TO 4 STEP -1  BEEP
.01,z  LET dt=dt+1  PRINT AT dt,
z, INK 2,"■"  NEXT z
1600 FOR z=5 TO 10  BEEP .01,z
PRINT AT z,8, INK 2,"■"  NEXT z
1610 FOR z=8 TO 11  PRINT AT 5,
 INK 2,"■" AT 7,z,"■",AT 8,z,"
 AT 10,z"■"  BEEP .01,z  NEXT
1620 FOR z=5 TO 10  BEEP .01,z
PRINT AT z,13, INK 2,"■"  "■"
1630 NEXT z
1640 FOR z=14 TO 16  BEEP .01 z
PRINT AT 5,z  INK 2,"■",AT 7,z
"■" AT 8,z,"■"  NEXT z
1650 FOR z=5 TO 10  BEEP .01,z
PRINT AT z,19  INK 2,"■"  NEXT
1660 LET dt=4
1670 FOR z=20 TO 22  BEEP .01,z
LET dt=dt+1  PRINT AT dt,z, IN
2,"■"  NEXT z
1680 FOR z=22 TO 20 STEP -1  BE
.01,z  LET dt=dt+1  PRINT AT
z, INK 2,"■"  NEXT z
1690 PRINT AT 5,21, INK 2,"■",A
5,22,"■",AT 9,22,"■",AT 10,21,
"■"
1700 FOR z=5 TO 8  PRINT AT z,3
 INK 2,"■"  NEXT z
1710 PRINT AT 10,2"■"
1720 FOR z=20 TO 30 STEP RND*RN
D+1  BEEP .01,z  BEEP .01,RND
*15  NEXT z
1730 PRINT AT 15,5,' your score
 ';score  IF score>hs THEN PR
T '  which is the highest toda
y'
1740 IF score>hs THEN LET hs=sc
re
1750 GO TO 1350
1760 PRINT ''  You reached
level  ;sk
1770 PRINT  'Another try (y/n)?
1780 LET z$=INKEY$
1790 IF z$="" THEN GO TO 1780
1800 IF z$="y" THEN CLS  RESTO
RE  GO TO 40
1810 IF CODE z$<>110 THEN GO TO
 1780
1820 CLS  STOP
1830 REM
1840 CLS  PRINT FLASH 1,AT 0,2
CONGRATULATIONS"
1850 FOR z=INT (RND*5) TO 25 ST
EP (RND*7)+1
1860 BEEP .1,z
1870 NEXT z
1880 PRINT '' "  You have clear
ed 6 crosses"
1890 PRINT  "  from level
 ";sk
1900 PRINT ' '
1910 LET sk=sk-1
1920 IF sk<0 THEN GO TO 1310
1930 PRINT ' ' "You will return
 level ";sk
1940 PRINT AT 21,2," Press any
key to continue"
1950 FOR b=3 TO 25
1960 LET mo1=b  LET mo2=mo1-1
LET mo3=mo2-1  LET mo4=b-1
1970 PRINT AT 12,mo1, INK INT
(RND*7),"■■■
```

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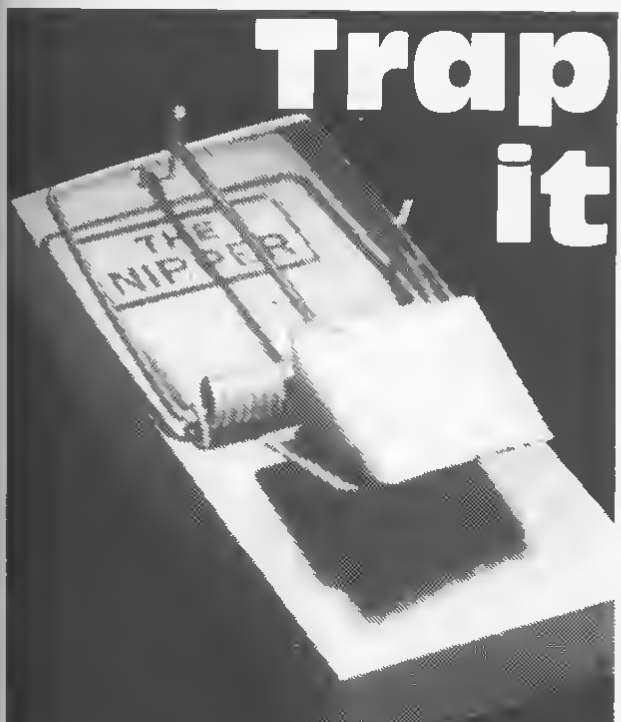
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Trap it



The experts said it couldn't be done – to disable the Break key in a BASIC program, but Mr D Pope shows us how it CAN be done.

ON—ERROR processing is one of the few useful features omitted on the Sinclair machines but I realised quite recently that it would be possible (with the aid of a small machine code routine) to provide such a function. In the section of the Spectrum manual which contains details of the system variables (Chapter 25) there is a WORD entry called ERR_SP at address 23613 which is described as the "Address of item on machine stack to be used as error return".

I examined by using the PEEK command in a function as shown below.

It was obvious that the word at 23613 pointed at an entry in the machine stack and this was printed giving the value 4867 which is within the Sinclair ROM. I wrote a small machine code routine (not included here) which simply jumped to 4867 after placing a required value in to the system variable ERR_NR and found that I got the appropriate error report as shown in the Sinclair manual in appendix B. It seemed reasonable to assume that if the stack entry pointed to by ERR_SP was altered to address a machine code routine other than 4867 then any subsequent error would cause the alternative routine to execute.

I developed the machine code routine shown quite quickly and it worked for all errors except 12 (C in the Sinclair manual). "Nonsense in BASIC" which, despite considerable further effort, I could not trap without putting the machine into a recursive loop. The machine code routine consists of two parts: the first labelled START is run from BASIC with an appropriate USR nnnn call and thus places the address of the second part, TRAP, into the machine stack entry pointed to by ERR_SP. The TRAP routine is then entered on any error completion (from 0 upwards).

Names and addresses

Although comprehensive comments have been included with the machine code a little additional explanation is probably worthwhile, particularly since the routines were written to be run wherever they are placed in memory. First, the address of TRAP placed onto the machine stack must be the correct absolute address regardless of where the routine is stored. This is calculated dynamically by the first two instructions, relying on the fact that the BC register pair contains the address of START on entry from the USR nnnn function. This absolute address is placed into the machine stack entry pointed to by ERR_SP by the next five instructions.

Secondly, the TRAP routine must be able to replace its own entry address onto the machine stack if it is to handle successive errors and although this is done by the two instructions starting at PUSH, the value used for TRAP in the LD DE,TRAP instruction must be modified in order to allow it to function correctly when loaded at differing memory addresses. The last five instructions in the START routine before RET place the corrected value into the instruction labelled PUSH to overcome this problem.

It must be stressed that instruction modification of this type is very bad programming practice and should only be used where there is no alternative. The modified instructions should be adequately explained as should those which carry out the modification. In this instance I could see no way of avoiding dynamic instruction modification but if anyone can offer an alternative approach I should be most interested to hear from them.

Basically speaking

When the trap routine is entered (on any BASIC completion) it first checks the given error code and passes control to the normal error handling code at 4867 if

the error is either 0 (OK) 9 (STOP) or 12 (Nonsense in BASIC) this gives the BASIC programmer the option to allow his program to end normally when required by executing STOP or issuing a GOTO for a line past the end of the program Without this way out the only way to terminate a program with TRAP incorporated would be to pull out the power lead a point which will not be missed by anyone who wishes to protect the code of a BASIC program As indicated at the beginning of the article error 12 seems impossible to recover from and is therefore also given back to the Spectrum routine to handle

For any error other than 0 9 and 12 the TRAP stack entry is restored and then the number of the BASIC line chosen to begin ON—ERROR processing is placed into the system variable NWPPC I chose line 9900 statement 1 but this could easily be changed as required by following the comments against the EQUates for GTOLL GTOLH and GTOST In order that the users error handling routine (beginning at line 9900) can make routing decisions based on the line where the error occurred the next few instructions save the line statement and error numbers These data is could be placed into any spare memory locations (four bytes are required) but since I do not have a printer I often use the printer buffer as workspace and the routine stores the crash details there The error line number is placed into the word at 23296 the statement number within that line is put into the byte at 23296 and the actual error number (increased by 1) is stored in the byte at 23299 It should be noted that the error is stored as a binary number not in the equivalent character form given in the normal error reports expected from the BASIC thus 21 would be shown following an attempted BREAK if the contents of 23299 was PEEKED

Finally in the TRAP routine the ERR NR is reset to 255 (its normal value) and a jump is made to the normal processing loop used when executing a BASIC program The address (7030) of MAINL was found by a small routine (not included here) which printed the contents of the first few machine stack entries which always shows 7030 immediately below the word with 4667 Although the routine could be used from a direct command it would serve little purpose since the trap address would be reset by the Spectrum routine when the command execution completed The TRAP only needs to be set up once in a BASIC program and will continue to pass errors to line 9900 until an error 0 9 or 12 is encountered

Any BASIC programmer who has ever wished for an ON—ERROR function will have few problems finding uses for this routine but as a starter it is fun to produce a small program which keeps going regardless of attempts to BREAK it and only finishes when it has done its job

```
10 RANDOMISE USR nnnn
20 PRINT "STOP ME IF
   YOU CAN"
30 FOR a = 1 TO 10000
40 PRINT AT 1,0;a
50 NEXT a
60 STOP
9900 PRINT AT 4,0; "NO 1
     WON T"
9910 PAUSE 100
9920 CLS
9930 GOTO 40
```

Of course the value used for "nnnn" will depend on where you decide to place the TRAP routine I have not included a loader with the routine details because so many good examples have been printed in the past that most people must be able to enter a machine code program without problems

The function for displaying WORD length data from any memory location which was mentioned at the beginning of the article is

```
10 DEF FN a(x) = PEEK
   x + 256 * PEEK (x + 1)
```

whereupon PRINT FN a(23613) gives a value just below RAMTOP and entering PRINT FN a(FN a(23613)) should return 4667

Incidentally I believe a similar function could be produced to give ON—ERROR handling to ZX81 users since that machine has a similar configuration of system variables Unfortunately I sold my ZX81 to fund the Spectrum and cannot therefore give any assistance with that project!

```
211400   START  LD   HL ÖFFSET     get offset to trap from entry point
09               ADD  HL BC        add entry address from BC reg pair
E05B3D5C         LD   DE (ERRSP)   get addr of stacked error return
EB               EX   DE HL        HL now points at stacked error rtn
73               LD   (HL) E       changed stacked value to point at TRAP
23               INC  HL           one byte at a time
72               LD   (HL) D       any error will now execute TRAP
212700           LD   HL TRAPA     get offset to our trap restore instruction
09               ADD  HL BC        add entry address as above
73               LD   (HL),E       and store this into the PUSH below
23               INC  HL           one byte at a time
72               LD   (HL) D       to ensure code can be loaded anywhere
C9               RET               go back to BASIC setup is finished
                 TRAP ROUTINE ENTERED ON ANY ERROR
210313   TRAP    LD   HL BTRAP     prepare to use SPECTRUM error rtn
3A3A5C           LD   A (ERRNR)    get the error code
3C               INC  A            add one to get correct value
2808             JR   Z JUMP       if the BASIC opted to finish do so
FE09             CP   9            error 9 is STOP if the BASIC opted
2804             JR   Z JUMP       for this then do so
FE0C             CP   12           error 12 (CI is NONSENSE IN BASIC If
2001             JR   NZ PUSH      we trap that we are recalled for ever
E9       JUMP    JP   (HL)         finish via BASIC error routine on 0 9 12
11EE5C   PUSH    LD   DE TRAP      this instruction is modified at set up
05               PUSH DE           restore our TRAP entry point for futures
21425C           LD   HL NWPPC     force a GOTO 9900 when we return to BASIC
36AC             LD   (HL) GTOLL   low byte of line number 9900
23               INC  HL           step to NEWPPC + 1
3628             LD   (HL) GTOHL   high byte of line number 9900
23               INC  HL           step to NSPPC
3601             LD   (HL) GTOST   statement 1 of line 9900
23               INC  HL           step HL to PPC the line we trapped from
110058           LD   DE PRTBF     point DEstination at the vacant buffer
010300           LD   BC 3         set a byte count of 3 and save trapped
EDB0             LDIR              line and statement in print buffer
3A3A5C           LD   A (ERRNR)    pick up the error code
3C               INC  A            step it to give corrected value
12               LD   (DE) A       and save the trap code in the p buffer
3EFF             LD   A 255        reset trap code to 0 (minus 1)
323A5C           LD   (ERRNR) A    and replace in error code variable
C37618           JP   MAINL        return to BASIC interpreter
                 EQUATES
0014     OFFSET  EQU  TRAP START   —used to create the actual TRAP address
0027     TRAPA   EQU  PUSH+—START  gives offset to TRAP addr in instr PUSH
1303     BTRAP   EQU  4667         the normal trap used by BASIC
5C42     NWPPC   EQU  23618        , the system variable for GOTO line
5C3A     ERRNR   EQU  23610        system variable containing report code — 1
5B00     PRTBF   EQU  23296        start of printer buffer, free if no pr
0026     GTOHL   EQU  38           HI byte of line no 9900 INT(9900/256)
00AC     GTOLL   EQU  172          LO byte of line no 9900 9900 256*38
0001     GTOST   EQU  1            statement no within line 9900
1B76     MAINL   EQU  7030         BASIC interpreter to continue running
5C3D     ERRSP   EQU  23613        pointer to stacked error return address
                 END               program length s 004Bh — 75 decimal
```

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King-kong

A great adaptation of the arcade game from Nicholas Wyre of Monks Risborough.



In this game you must attempt to save a girl from the evil clutches of the giant gorilla King kong To get to the girl and free her you must jump over the gorillas and holes and climb the ladders

However you must carry out three tasks in order These are
1 — Go and rescue the girl from the clutches of King kong To do this you will have to either jump between King kong s legs where there is a space or jump onto the barrel and run to keep up with it and jump off again If you fall off the barrel the line will break and you will fall to your death
2 — When you have managed to free the girl you must go back down to the ground level and press the button at the bottom left of the screen
3 — Lastly you must knock out the pins on each level by running over them When you have knocked out the last pin King kong will fall to his death If during the game you accidently knock a girder out you will not be able to complete this part of the game — so take care

The key to success

The keys used to manipulate your character around the screen are as follows

4 — Jump to the left
5 — Run to the left
6 — Go down a ladder
7 — Go up a ladder
8 — Run to the right
9 — Jump to the right

Program description

The program comprises two parts the first of which is the main part of the program Here follows a brief breakdown of the operation of the listing

Lines 10 30	Load the user defined graphics from Listing 2 and set the variables
Lines 40 50	Set up the clock
Lines 60 140	The main part of the program
Lines 100 130	Print King kong
Lines 140 270	Move the gorillas and the barrel
Lines 190 320	
370 and 380	Move your character
Lines 330 360	See if your character has hit anything
Lines 280 and 390	See if your character has reached the girl character or pressed the button
Lines 420 440	Tell you that your character has been killed
Lines 450 470	Ask you if you would like to play another game
Lines 480 520	Your character falls through a hole
Lines 530 550	Your character is dead
Lines 560 610	Your character breaks the line by falling off the barrel
Lines 620 650	Your character walks over a pin
Lines 660 770	The girl character goes to the lift
Lines 780 800	Your character jumps to the left
Lines 810 830	Your character moves to the right
Lines 840 870	The girder falls
Lines 880 900	The lift goes up with the girl inside
Lines 910 920	The final girder pin falls along with King kong
Lines 930 970	You are asked if you want another game
Lines 980 990	You are told you have completed your mission in the shortest time
Lines 1000-1160	Print the building site

Typing tips

First of all you should type in the program Listing 1 You should then SAVE it to tape and VERIFY it Now NEW the computer to wipe the listing out of memory Now type in Listing 1 and RUN the program When the program has finished RUNning it will instruct you to start SAVEing The user defined characters will then be SAVEd after the main program so that when you LOAD the program on tape the user defined graphics will automatically be LOADed into the main program via line 20

The number of times the gorillas follow you is governed by the 75 in line 160 If you alter the 75 to 1 the gorillas will not follow you and consequently, if you make this figure less then 75 the gorillas will follow you more often

```
  10 REM          KING-KONG'
     by      NICHOLAS WYRE
  20 LOAD  "CHARACTERS"CODE USR
"a",18*8  BORDER 2   INK 3   PAPER
3  CLS    LET H=9999   LET N$= "NIC
HOLAS WYRE"
  30 LET J=0   LET E=1   LET F=-1
  LET C=1   LET V=21   LET G=500   L
ET M=21   LET N=2   LET E=1   LET T
=0   LET E$="G    GO SUB 1800   LET
 B=2   LET C=1
  40 POKE 23672,0   POKE 23673,0
POKE 23674,0
  50 DEF FN S()=INT ((PEEK 23672
+PEEK 23673*256+PEEK 23674*65535
)*50)
  60 PRINT AT M,N, INK 1, OVER 1
,E$  BEEP .05,10   PRINT AT M,N
,OVER 1, INK 1,E$
  70 PRINT AT 2,0, INK 1," A ",A
T 1,B,
  80 PRINT AT 9,C,"  L   L   L ",AT
13,V,"  L   L   L ",AT 17,C,"  L   L
  L ",AT 21,V,"  L   L   L "
  90 LET Z$=INKEY$
 100 IF RND<.5 THEN PRINT AT 3,1
3,"  ":  GO TO 120
 110 PRINT AT 3,19,"  "
 120 IF RND<.5 THEN PRINT AT 5,1
9,"  ":  GO TO 140
 130 PRINT AT 5,19,"  "
 140 IF B=2 THEN LET D=1
 150 IF B=6 THEN LET D=-1
 160 IF RND<.75 THEN GO TO 220
 170 IF V>2 AND V>N THEN LET V=V
-1
 180 IF V<21 AND V<N THEN LET V=
V+1
 190 IF C<21 AND C<N THEN LET C=
C+1
 200 IF C>2 AND C>N THEN LET C=C
-1
 210 GO TO 270
 220 LET C=C+E   LET V=V+F
 230 IF C>21 THEN LET E=-1
 240 IF C<3 THEN LET E=1
 250 IF V<3 THEN LET F=1
 260 IF V>21 THEN LET F=-1
 270 LET B=B+D
 280 IF M=2 AND N=11 AND X=8 THE
N GO SUB 660
 290 IF Z$="7" AND ATTR (M-1,N) =
41 THEN LET E$="N"   LET M=M-1
 300 IF Z$="6" AND ATTR (M+1,N) =
41 THEN LET E$="N"   LET N=M+1
 310 IF Z$="5" AND N>0 THEN LET
N=N-1   LET E$="W"
 320 IF Z$="8" AND N<>31 THEN LE
T E$="M"   LET N=N+1
 330 IF SCREEN$ (M,N)<>" " AND A
TTR (M,N)<40 THEN GO TO 420
 340 IF SCREEN$ (M,N)="_" THEN G
O TO 560
 350 IF SCREEN$ (M+1,N)=" " AND
M<>21 THEN GO TO 480
 360 IF ATTR (M+1,N)=107 THEN GO
SUB 620
 370 IF Z$="4" AND N>1 THEN GO S
UB 780
 380 IF Z$="9" AND N<30 THEN GO
SUB 810
 390 IF M=21 AND N=0 AND X=1 THE
N GO SUB 860
 400 BEEP .01,1
 410 GO TO 60
 420 PRINT AT M,N, FLASH 1, "O",A
T 10,13,"CRUNCH"
 430 FOR N=0 TO 7   FOR X=0 TO 7
   BEEP .05,N   BORDER RND*7   NEXT
X   NEXT N
 440 PAPER 3   INK 7   CLS   FLASH
1   PRINT AT 8,5,(" KING-KONG KI
LLED YOU " AND M=5),AT 8,5,("A G
ORILLA SQUASHED YOU" AND M<>5)
 450 PRINT AT 15,1,"PRESS ANY KE
Y TO PLAY AGAIN  !",AT 14,1,"SHO
RTEST TIME = ",H,"  by ",N$
 460 IF INKEY$=""   THEN BEEP .01
,RND*25   BORDER RND*7   GO TO 460
 470 FLASH 0   BORDER 2   INK 3   P
APER 5   CLS   GO TO 30
 480 IF SCREEN$ (M,N)<>" " THEN
LET M=M-1   GO TO 530
 490 PRINT AT M,N," ";AT M-1,N,
"G"
 500 IF M=21 THEN GO TO 530
 510 LET M=M+1   BEEP .03,M
 520 GO TO 480
 530 PRINT AT M,N, FLASH 1,"O",A
T 10,13,"SPLAT!"
 540 FOR N=0 TO 7   FOR S=7 TO 0
STEP -1   BEEP .01,S*N   BORDER S
   NEXT S   NEXT N
 550 PAPER 4   INK 1   CLS   FLASH
1   PRINT AT 8,4,"YOU FELL THROU
GH  A HOLE",AT 10,9,"TO YOUR  DE
ATH",AT 12,1,"AND YOU ARE NOW HO
LDING THINNER !"   GO TO 450
 560 PRINT AT 1,2,"                AT 2
,2,"(          )",AT 3,2,"          )",AT
```

```
 4,2,"R    LET N=N+(1 AND N=2)-(1
 AND N=7)
 570 FOR A=2 TO 5  PRINT AT A-1,
N,"
 580 BEEP .04,M
 590 PRINT AT A,N,"G"  NEXT A
 600 LET M=5
 610 GO TO 530
 620 LET T=T+1  PRINT AT M+1,N,
"
 630 IF SCREEN$ (M+1,27)="-" AND
 N=13 THEN GO SUB 840
 640 IF SCREEN$ (M+1,13)="-" AND
 N=27 THEN GO SUB 840
 650 BEEP .01,50  RETURN
 660 LET X=1
 670 PRINT AT 0,6, FLASH 1,"MMMM
MM"  BEEP 1,10
 680 FOR A=11 TO 13  PRINT AT 1
A," P",AT 2,A," O"  BEEP .05,A
 NEXT A
 690 INK 1
 700 PRINT AT 2,14,"F"  BEEP .05
,50
 710 FOR A=14 TO 25  PRINT AT 0,
A," P",AT 1,A,"▀O"  BEEP .01,A
 NEXT A
 720 PRINT AT 0,13," F",AT 1,14
,"F"
 730 FOR A=0 TO 3  PRINT AT A,28
,"F",AT A+1.26,"P",AT A+2,26,"O
"  BEEP .05,A  NEXT A
 740 PRINT AT 4,26,"FP",AT 5,26
,"FO"  BEEP .0,50
 750 FOR A=27 TO 29  PRINT AT 4
A,"P",AT 5,A," O"  BEEP .05,A
 NEXT A
 760 INK 1  PRINT AT 4,29,"▌",AT
 5,29,"▌",AT 4,30, FLASH 1,"P",A
T 5,30,"O"
 770 FLASH 0  RETURN
 780 PRINT AT M-1,N-1, OVER 1,"J
"  BEEP .05,M  PRINT AT M-1,N-1,
OVER 1,"J  BEEP .05,M
 790 IF SCREEN$ (M,N-2)<>" " AN.
ATTR (M,N-2)=40 THEN GO TO 420
 800 LET N=N-2  RETURN
 810 PRINT AT M-1,N+1, OVER 1, I
"  BEEP .05,M  PRINT AT M-1,N+1
OVER 1,"I"  BEEP .05,M
 820 IF SCREEN$ (M,N+2)<>" " AND
ATTR (M,N+2)=40 THEN GO TO 420
 830 LET N=N+2  RETURN
 840 IF T=6 AND N=2 THEN GO TO 2
10
 850 FOR O=M+1 TO M+4
 860 BEEP .01,0  PRINT AT 0-1,14
,"▀▀▀▀▀▀"  AT 0,14, "▀▀▀▀▀▀"
▀▀▀▀▀▀▀▀  NEXT 0
 870 RETURN
 880 LET K=2  PRINT AT 4,30,"▀".
AT 5,30, "▀",AT 3,30,"▀"
 890 BEEP 1,0
 900 FOR A=5 TO 2 STEP -1  PRINT
 AT A,29,"  ",AT A-3,29,"▀▀ "
BEEP .1,A  NEXT A  PRINT AT 2,29
," "  BEEP .1,10  PRINT AT 1,2
9,"  "  BEEP .1,15  PRINT AT 0,
29,"  "  BEEP 1,20  RETURN
 910 LET S=FN S()  PRINT AT 2,20
," ",AT 3,19,"A▀CGULP!"  BEEP .5
,2  PRINT AT 3,19,"  ",AT
4,19,"▀▀  ",AT 5,20,"D"  BEEP .5,
3  PRINT AT 4,19,"  ",AT 5,20,"
",AT 5,19,"B▀▀E"  BEEP .5,3
 920 FOR 0=6 TO 21  PRINT AT 0,1
4, "▀▀▀▀▀▀▀▀▀▀▀▀",,AT 0-2,19,"
",AT 0-1,14,"  B▀▀E  "  6
BEEP .05,0  NEXT 0  FOR J=-50 TO
50  BEEP .03,J  NEXT J
 930 PAUSE 100  CLS  PRINT AT 2
,0,"YOU HAVE KILLED KONG AND YOU
 HAVE SAVED THE PAINCESS.","
TIME = ";S
 940 IF S<M THEN GO SUB 960
 950 PRINT AT 15,5,"THE SHORTEST
 TIME = ";M;" BY 51R ";N$
 960 PRINT AT 16,0, FLASH 1,"PR
SS ANY KEY FOR ANOTHER  GAME!"
 BORDER RND*7  BEEP .01,RND*25
 IF INKEY$="" THEN GO TO 960
 970  BEEP 1,6  CLS  GO TO 30
 980 LET M=S  INPUT "YOU HAVE T
E SHORTEST TIME  PLEASE EN
ER YOUR NAME ?  ";N$
 990 RETURN
1000 FOR Q=5 TO 21  PRINT AT 0,
, INK 1,"F",AT 0,31,"F"  NEXT 0
1010 PRINT AT 6,1,  INK 0,"▀▀▀▀▀
▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀",AT 1
▀,"▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀
```

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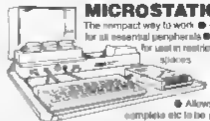
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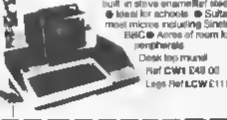


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Mastering Machine Code — the final part

Sadly we've reached the last part of Toni Baker's superb series that takes the mystery out of Machine Code. But don't despair, she will be back and has promised us something special for the next issue . . .

This is to be the last in the series of articles bearing this title. This doesn't mean that I'm not writing for the magazine anymore — just that the next time around I'll be starting on something different. However, SINCE this is the last MMC bit I thought I'd go out with a bang. I'd like to list for you what is possibly the most sophisticated machine code program ever printed in any computing magazine.

This is a WORD PROCESSOR program. I call it WordSheep in order to stop things from getting too serious. Let me describe to you what is does first of all, starting with the limitations.

Firstly, you may only work with one screenful of text at a time. This means that if you want to type out a long letter you must treat it in seperate parts although note that this won't actually matter because using the ZX printer there will be no "join" between the screenfuls. You can't do clever things like copying whole paragraphs all over the place or shuffling blocks of text around. Here's what you CAN do.

The LETTER keys produce the letters of the alphabet — either in upper or lower case as required. You should not type ENTER between lines because the program will sort all that out for itself, straightening the right hand margin up in the process. The SPACE key works as you'd expect although the actual number of spaces between words is determined by the program and not by you, so that if you type five spaces between two words this will be compressed to one (or more as required for the right hand margin to be straight). The NUMBER keys also do exactly what you'd expect them to. There are four teen CONTROL FUNCTIONS available to you, and these are as follows:

EDIT	(caps shift 1)	Bring down one line for editing
CAPS LOCK	(caps shift 2)	Change from L mode to C mode and vice versa
CLEAR LINE	(caps shift 3)	Erase one line of text
CLEAR SCREEN	(caps shift 4)	Blank the whole screen
CURSOR LEFT	(caps shift 5)	Move cursor left
CURSOR DOWN	(caps shift 6)	Move cursor down
CURSOR UP	(caps shift 7)	Move cursor up
CURSOR RIGHT	(caps shift 8)	Move cursor right
COPY	(caps shift 9)	Copy the screen onto the ZX printer
DELETE	(caps shift 0)	Delete one character at the cursor position
ENTER	(enter)	End of paragraph
REFORM	(symbol shift Q)	Re-construct paragraph after alterations have been made
EXIT	(symbol shift W)	Return to BASIC
YOURS	(both shifts)	User Defined Control Function

Symbol shift in this program works slightly different to what you're used to. The differences are as follows:

Symbol shift O	and symbol shift W are as above
Symbol shift E	produces the copyright symbol (character 7F hex)
Symbol shift I	produces something called a SOLID SPACE. This looks like a space to me and you, but isn't treated like one by the computer. It is in fact the graphics character whose code is 80 hex. It may be used where specific spacing is required.

All other keys with symbol shift will produce the ASCII character which is printed in red either on or below that key. This means that you do not need to enter E mode in order to obtain curly brackets — you simply press symbol shift F and G. (Note that E mode is not used at all in this program and that no keywords or tokens may be obtained).

OK, here's the program. In order to minimise errors I shall for a change include the absolute addresses which I have used. You may change these, of course — for instance, subtracting 8000 from all addresses will allow the program to run on a 16K Spectrum. The only restriction on changing my addresses is that the second and third tables at the start of the program must use the same high part address all the way through — in this case EA. Before you start typing in the listing note that the program uses GRAPHIC_A which is defined thus:

```
00    GRAPHIC_A    DEFB 00000000b
00                 DEFB 00000000b
FF                 DEFB 11111111b
00                 DEFB 00000000b
00                 DEFB 00000000b
FF                 DEFB 11111111b
00                 DEFB 00000000b
00                 DEFB 00000000h
```

And now the program. First come three tables which will be constructed by the program itself:

```
                ORG E800
U_TABLE         DEFS 0280     Occupies addresses E800 to EA7F
L_TABLE         DEFS 80       Occupies addresses EA80 to EAFF
S_TABLE         DEFS 20       Occupies addresses EB00 to EB1F
```

The first subroutine is used to delete all unwanted spaces in the line being edited. This line resides in L_TABLE (Lower Screen Table)

```
                        ORG EB00
21E0EA  COMPRESS  LD HL EAE0   HL  points one byte bry   d
                                L__TABLE
3E20              LD A  space
06 5F             LD B  5F      B  =  number of character
                                positions to check
2B                DEC HL        HL  po nts to next byte in
                                L__TABLE
BE                CP (HL)       Is there a space at tha
                                location?
2003              JR NZ C  2    Jump if a (non space)
                                character found
10FA              DJNZ C  1     Repeat for whole file  (Note
                                 1 is not necessary to check
                                very last character)
C9                RET           Exit if the file  s full of
                                spaces (except possibly for
                                the f rst byte)
2E80    C__2      LD L 80       HL  po nts to first byte of
                                L__TABLE
0ED1              LD C 01       C is  space to be deleted
                                flag
BE      C__3      CP (HL)       Is there a space at tha
                                locat on?
2015              JR NZ C  5    Jump if not
0D                DEC C         Test  space to be deleted
                                flag
200E              JR NZ C  4    Jump  f space is  not  to be
                                deleted
C5                PUSH BC
04                INC B         B  =  number of bytes to
                                mave
E5                PUSH HL
54                LD D H
5D                LD E L        DE  =  address of space to
                                be deleted
23                INC HL        HL  =  address of next byte
46                LD C B
0600              LD B 00       BC  =  number of bytes to
                                move
EDB0              LDIR          Delete space
E1                POP HL
2B                DEC HL        HL  points to f rst
                                (undeleted) space
C1                POP BC        B  =  number of bytes left to
                                check
0E01    C__4      LD C 01       Set  space to be deleted
                                flag
1802              JR C__6
0E00    C  5      LD C 00       Reset flag (ie space  not  to
                                be deleted)
23      C__6      INC HL        Point to next character
                                along
10E3              DJNZ C__3     Repeat for as many bytes
                                as are necessary
C9                RET           End of subroutine
```

The table S TABLE (Spaces Table) stores a sequence of bytes each of which is the low part of the address of a space character somewhere in L__TABLE. The job of this next subroutine is to insert C spaces into L__TABLE at the address whose low part is stored at address HL (to insert C spaces at address H*100h+(HL))

```
                        ORG EB50
F5      INS  SPACE      PUSH AF
C5                      PUSH BC
D5                      PUSH DE
E5                      PUSH HL
BE                      LD L (HL)
E5                      PUSH HL
3EDF                    LD L DF
0600                    LD B 00
A7                      AND A
ED42                    SBC HL BC
54                      LD D H
5D                      LD E L
E1                      POP HL
2B                      DEC HL
EB                      EX DE HL
C5                      PUSH BC
E5                      PUSH HL
A7                      AND A
ED62                    SBC HL DE
44                      LD B H
4D                      LD C L
E1                      POP HL
```

HL address of existing space
Stack the address
HL points to last byte of L__TABLE
BC number of spaces to insert

HL points to last byte which will
rema n after insertion

DE address last byte to rema n
HL = address of existing space

HL number of bytes to move

BC number of bytes to move
HL = address of last byte to
remain

```
11DFEA                  LD DE EADF    DE  points to last byte in L  TABLE
EDB8                    LDDR          Moves required characters
EB                      EX DE HL      HL  points to last new space
C1                      POP BC        BC  number of bytes inserted
41                      LD B C        B  number of bytes inserted
3E2D    IS  LOOP        LD (HL)  space  Overwrites next byte
2B                      DEC HL        Point to next byte to overwrite
10FB                    DJNZ IS__LOOP Repeat for each of the new
                                      positions
E1                      POP HL        HL  points into S__TABLE
E5                      PUSH HL
23      S  SPACES       INC HL        Point to next address-low part
7E                      LD A (HL)     A  former low part of address of
                                      space
FE AD                   CP AD         Ex t if not within the f rst 20h bytes
3004                    JR NC IS__EXIT
81                      ADD A C
77                      LD (HL) A     Update address pointer
18F8                    JR IS__SPACES Repeat for all addresses
E1      IS__EXIT        POP HL
D1                      POP DE
C1                      POP BC        Note that this subroutine leaves all
                                      registers unchanged
F1                      POP AF
C9                      RET           End of subroutine
```

A rather intricate subroutine now. The purpose of this subroutine is to insert spaces into the line being edited so that a single space occurs at the thirty third position. Thus a complete word will end at the thirty second position ensuring that right hand margins remain straight

```
                        ORG EB6B
01D0B0  ADJUST    LD BC D0B0    BC  number of bytes in
                                L  TABLE
11EDEA                  LD DE EAED    DE points to start of S  TABLE
21BDEA                  LD HL EAB0    HL points to start of L  TABLE
3E20    A  SEARCH       LD A  space
EDB1                    CPIR          Search for next space
2007                    JR NZ A__ST  DONE  Jump if no spaces left to find
7D                      LD A L
3D                      DEC A         A  low part of address of
                                      space
12                      LD (DE) A     Store in S__TABLE
1C                      INC E         DE  points to next byte in table
20F4                    JR NZ A  SEARCH  If room in table then repeat for
                                      next space
1D                      DEC E         DE  EAFF (Last byte of
                                      S__TABLE)
EB      A  ST__DONE     EX DE HL      HL  points to last used byte in
                                      S  TABLE
36FF                    LD (HL) FF    Store end of table marker
2EE0                    LD L E0       HL  points to first byte of
                                      S__TABLE
7E                      LD A (HL)     A  low part of address of first
                                      space
FE0F                    CP 0F
D0                      RET NC        Return  f there are no spaces
                                      w thin the first thirty one bytes
                                      since adjustment would be
                                      impossible
47      A__SP__END      LD B A        B  low part of address of last
                                      space
23                      INC HL        Point to next element of table
7E                      LD A (HL)     A  low part of address of next
                                      space
FE FF                   CP FF         Check against end of t le marker
28 0D                   JR Z A__CH__2 Jump if end of file reached
4F                      LD C A        Temporarily store in C
90                      SUB B         A  distance between last two
                                      spaces
3D                      DEC A         Set zero flag  f there are two
                                      spaces in a row  (This will only be
                                      the case if the end of the text has
                                      been reached)
79                      LD A C        Restore A
28 05                   JR Z A__CH  1 Jump  f end of text reached
FE A0                   CP AD         Is there a space at the thirty third
                                      one (yn)?
C8                      RET Z         Return if so  since no adjustment
                                      is needed
18EE                    JR A__SP__END Otherwise check next space
36FF    A__CH__1        LD (HL) FF    Marks  end of file
2EE1    A__CH__2        LD L E1       HL  points to second element of
                                      S__TABLE
3EAD                    LD A AD
BE                      CP (HL)
C8                      RET Z         Return if there is only one space
                                      in the first thirty two bytes  since
                                      adjustment would be impossible
D8                      RET C
1E00                    LD E 0D
4E      A__NUMBER       LD C (HL)     C  low part of address of  ast
                                      space
1C                      INC E         E  counts number of spaces
23                      INC HL        Point to next space
BE                      CP (HL)
```

```
30FA                    JR NC A__NUMBER     Repeat for all spaces within first
                                            20h bytes
01                      SUB C               A = total number of spaces to
                                            insert
0EFF                    LD C FF
0C          A__MOD      INC C               C calculates INT (number of
                                            spaces required number of
                                            existing spaces in range)
03                      SUB E               A records remainder of the
                                            division
30FC                    JR NC A__MOD        Note that A is adjusted once more
                                            than needed
83                      ADD A E             Restore A to true remainder
57                      LD D A              D = remainder of division
0C                      INC C
0D                      DEC C
2809                    JR Z A__REMAIN      Jump if division equals zero
43                      LD B E              B number of existing spaces in
                                            range
2EE0                    LD L E0             HL points to first element of
                                            S__TABLE
CD30EB  A_SL_1          CALL INS__SPACE     Insert C spaces
23                      INC HL              Point to next element of
                                            S__TABLE
10FA                    DJNZ A__SL_1        B*C spaces have now been
                                            inserted evenly
14          A__REMAIN   INC D
15          A__SL_2     DEC D
C9                      RET Z               Task complete. Exit subroutine
D5                      PUSH DE
2A7B5C                  LD HL (SEED)        HL random number seed
54                      LD D H
5D                      LD E L
29                      ADD HL HL           Multiply by 2
29                      ADD HL HL           4
19                      ADD HL DE           5
29                      ADD HL HL           8
29                      ADD HL HL           16
29                      ADD HL HL           32
19                      ADD HL DE           33
227B5C                  LD (SEED) HL        Store new random number seed
D1                      POP DE              Restore D and E
7C                      LD A H              A random number
83          A__RANDOM   SUB E
20FD                    JR NC A__RANDOM
83                      ADD A E             A random number between 0
                                            and E-1
CBE0                    ADD A E0
6F                      LD L A
26EA                    LD H EA             HL points to random element of
                                            S__TABLE
0E01                    LD C 01             C number of spaces to insert
CD30EB                  CALL INS__SPACE     Insert spaces
18DC                    JR A__SL_2          Correct number of spaces have
                                            now been inserted (this bored
                                            me silly many times)
```

By contrast the next few subroutines are all really easy to follow. The job of this one is to copy text from L__TABLE to the lower part of the screen. Note that the system variable (DF__SZ) is assumed to be 04, not 02.

```
                        ORG EBE5
21A050  TRANSFER_L      LD HL 50A0          HL = print position on screen
22B55C                  LD (DFCC) HL        Store print position
212117                  LD HL 1721          HL = screen coordinates
22BA5C                  LD (SPOSNL) HL      Store coordinates
FD3B0201                LD (ITVFLAG) 01     Direct PRINT to lower part of
                                            screen.
2190EA                  LD HL EA80          HL points to start of
                                            L__TABLE
0640                    LD B 40             B number of bytes to print
7E          TL__PRINT   LD A (HL)           A next character to print.
23                      INC HL              Point to next character to print
D7                      RST 10              Print character
10FB                    DJNZ TL__PRINT      Repeat for 40h characters
3A815C                  LD A (L__CURSOR)    A low part of address of
                                            cursor in L__TABLE
C620                    ADD A 20            A = low part of address of
                                            cursor in attributes file
6F                      LD L A
265A                    LD H 5A             HL = address of cursor in
                                            attributes file
7E                      LD A (HL)           A attribute at that address
EE3F                    XOR 3F              Complement the colours
77                      LD (HL) A           Store new attribute to indicate
                                            cursor
C9                      RET
```

Notice that the subroutine above makes use of a program variable called L__CURSOR which is one byte long and lives at 5C81. It stores the low part of the address of the cursor within the edit-line (in L__TABLE). There is another variable used in the program and this is called U__CURSOR (Upper Cursor) which is two bytes long and stores the address of a second cursor – this time within U__TABLE. It is always at the left hand edge of the screen. Its address is 5CAF and it is made use of by this next subroutine which is called TRANSFER__. The purpose of this subroutine is very similar to the last one – it copies text from U__TABLE to the upper part of the screen.

```
                        ORG EC0C
210040  TRANSFER__U     LD HL 4000          HL print position on screen
22B45C                  LD (DF__CC) HL      Store print position
212118                  LD HL 1821          HL screen coordinates
22B85C                  LD (S__POSN) HL     Store coordinates.
FD3B0200                LD (ITVFLAG) 00     Direct PRINT to upper part of
                                            screen
2100EB                  LD HL EB00          HL points to first byte of
                                            U__TABLE
0130BG                  LD BC 8003          B 80 and C 03
7E          TU__PRINT   LD A (HL)           A next character to print
23                      INC HL              Point to next character to print
D7                      RST 10              Print character
10FB                    DJNZ TU__PRINT      Repeat for either 80 or 100
                                            characters (B 00 (effectively
                                            100)
0D                      DEC C
20F8                    JR NZ TU__PRINT     Total 02B0 bytes in all
2AAF5C                  LD HL (U__CURSOR)   HL points to cursor position
                                            in U__TABLE
7C                      LD A H              A = high part
D650                    SUB 50
57                      LD H A              HL points to cursor position
                                            in attributes file
3A8D5C                  LD A (ATTR__P)      A attributes normally used in
                                            screen
EE3F                    XOR 3F              Complement the colour
                WIPE__LINE  ?               Continued ...
```

This subroutine leads straight into a routine called WIPE__LINE which will be used quite a lot by other parts of the program. It pokes the byte held by the A register into 20h consecutive locations. In the above case it is used to complement the colour of one row of the upper part of the screen at the cursor position. It may also be called from the label WIPE in which case the number of locations to be poked is BC + 1.

```
                        ORG EC3B
011F00  WIPE__LINE      LD BC 001F          BC = number of locations to
                                            poke less one
54          WIPE        LD D H
5D                      LD E L              DE address of first location
23                      INC DE              DE address of second
                                            location
77                      LD (HL) A           Poke first location
EDB0                    LDIR                Fast remaining locations
C9                      RET
```

The next subroutine is the CLEAR SCREEN subroutine which is accessed upon running by caps shift 4. You should be able to follow it with no further explanation from me.

```
                        ORG EC40
2100EB  CLEAR__SCREEN   LD HL EB00          HL points at first byte of
                                            U__TABLE
22AF5C                  LD (U__CURSOR) HL   Reset upper cursor to top
3E00                    LD A 00             A low part of address of
                                            first byte of U__TABLE
32815C                  LD (L__CURSOR) A    Reset lower cursor to start of
                                            line
01DF02                  LD BC 02DF          BC the number of bytes in
                                            U__TABLE and L__TABLE
                                            combined less one
3E20                    LD A space
CD3BEC                  CALL WIPE           Fill both tables with spaces
CD0EEC                  CALL TRANSFER__U     Blank upper part of screen
C3E5EB                  JP TRANSFER__U       Blank lower part of screen and
                                            exit
```

Now things start getting really easy. This is the CURSOR LEFT routine.

```
                        ORG EC5B
3A815C  LEFT            LD A (L__CURSOR)    A address of cursor (low
                                            part)
FE00                    CP 00               Is cursor already at left of line?
C8                      RET Z               Return if so
CD3577                  DEC (L__CURSOR)     Otherwise move cursor left
C9                      RET                 And return
```

And with amazing similarity CURSOR RIGHT

```
                        ORG EC83
3A815C  RIGHT   LD A,(L_CURSOR)   A = address of cursor (low part)
FE1F            CP 1FH           Is cursor already at right of line?
C8              RET Z            Return if so
3D              INC A            Otherwise move cursor right
3277D0          LD (L_CURSOR),A
C9              RET              And return
```

This is the CURSOR UP routine

```
                        ORG EC8D
2AAF5C  UP      LD HL,(U_CURSOR) HL = address of cursor
1100E8          LD DE,-EA00      DE = address of topmost allowable position
A7              AND A
ED52            SBC HL,DE        Is cursor already at top?
C8              RET Z            Return if so
11E0FF          LD DE,FFE0       DE = vertical displacement up one line
1800            JR DOWN+3        Move cursor up
```

And as you'd expect the CURSOR DOWN routine

```
                        ORG EC7C
2AAF5C  DOWN    LD HL,(U_CURSOR) HL = address of cursor
1160EA          LD DE,EA60       DE = lowest position allowable
A7              AND A
ED52            SBC HL,DE        Is cursor already at bottom?
C8              RET Z            Return if so
012060          LD BC,6020       DE = vertical displacement down one line
2AAF5C  DOWN_UP LD HL,(U_CURSOR) HL = address of cursor
19              ADD HL,DE        Compute new position
22AF5C          LD (U_CURSOR),HL Store new position
30FE            JR NC,TRANSFER_U Return if new position still showing cursor in
                                 position
```

Now we come to the EDIT function. This is quite straightforward

```
                        ORG EC93
2AAF5C  EDIT    LD HL,(U_CURSOR) HL = address of upper screen
11B0EA          LD DE,EAB0       DE = address of first byte of L_TABLE
ED7377          LD (L_CURSOR),E  Move lower cursor to left of line
012000          LD BC,0020       BC = number of bytes in a line
79              LD A,C           A = space
EDB0            LDIR             Copy line into L_TABLE
063F            LD C,3F          BC = number of bytes to erase - less one
EB              EX DE,HL         HL = address of first byte to erase
1B57            JR WIPE          Erase lower display in L_TABLE
```

Now we come to the CAPS LOCK function. This relies upon the fact that the L mode/C mode is stored by the ROM as bit three of the system variable FLAGS2. This is reset for L mode or set for C mode.

```
                        ORG ECA7
3A6A5C  CAPS_LOCK LD A,(FLAGS_2) Fetch FLAGS_2
EE08            XOR 08           Complement bit three
326A5C          LD (FLAGS_2),A   Store altered variable
C9              RET
```

Easier and easier eh? The next subroutine is the COPY function which is used by the program to copy the top nineteen lines of the screen onto the ZX printer

```
                        ORG EC8D
F3      COPY_13 DI               This is because COPY won't work if the interrupts are enabled
0619            LD B,19          B = number of rows to copy (Note - eight rows equals one line)
C3A80E          JP COPY_B        Jump into ROM COPY routine. Note that this routine automatically re-enables the interrupts
```

Next comes the CLEAR LINE routine the purpose of which is to erase (ie overwrite with spaces) one line of text from the upper part of the screen at the cursor position

```
                        ORG EC8B
2AAF5C  CLEAR_LINE LD HL,(U_CURSOR) HL = points to upper cursor position
3E20            LD A,space
CD3BEC          CALL WIPE_LINE   Erase line as required
C30CEC          JP TRANSFER_U    Reprint upper screen with line erased
```

It is at this point that things start getting a little more intricate. This is the DELETE routine

```
                        ORG ECC1
CD59EC  DELETE  CALL CURSOR_LEFT Move cursor left (if possible)
C8              RET Z            Return if cursor already at line start
6F              LD L,A
2BEA            LD H,EA          HL = pointer to address of cursor
5F              LD E,A
1D              DEC E
54              LD D,H
2F              CPL
D61F            SUB 1F           A = number of bytes to move
4F              LD C,A
0600            LD B,00          BC = number of bytes to move
EDB0            LDIR             Bytes to be deleted
3E20            LD A,space
12              LD (DE),A        Fill last line with space
                                 (L_TABLE)
```

Next comes an exciting part! This is the CHARACTER routine which controls what happens when any character in the range 20 to 80 is given. The character in question starts its life (as far as this subroutine is concerned) in the A register

```
                        ORG ECD7
F5      CHR     PUSH AF          Stack character to add
3A815C          LD A,(L_CURSOR)  A = cursor position
21E1EA          LD HL,EAE1       HL = points to second byte of L_TABLE
3EFF            LD (HL),FF       Store an end of file marker
2B              DEC HL           HL = points to final byte of L_TABLE
77              LD (HL),A        Store cursor position
0ED1            LD C,D1          C = number of bytes to insert
CD30EB          CALL INS_SPACE   Insert one space at desired location
FDBE77          LD (IY+37),A     Store character to add to file
F1              POP AF           A = character to add to file
77              LD (HL),A        Store character at correct point
CD53EC          CALL CURSOR_RIGHT Move cursor right for next character
2808            JR Z,PROCESS     Jump forward if at right of line
3A1FEA          LD A,(EA1F)      A = thirty second character in file
FE20            CP space
C8              RET Z            If there is a space then don't bother to add
                                 [illegible]
```

Are you ready? This is the main processing routine. It may also be called from the labels PROCESS_1 and PROCESS_2. Please pay careful attention to what happens here

```
                        ORG ECF7
CD00E8  PROCESS   CALL COMPRESS  Remove all unwanted spaces
CD83E8  PROCESS_1 CALL ADJUST    Line up right hand margin
218DEA  PROCESS_2 LD HL,EA8D     HL = points to first byte of L_TABLE
ED5BAF5C          LD DE,(U_CURSOR) DE = address of upper cursor
012000            LD BC,0020     BC = number of characters in one line
EDB0              LDIR           Transfer one line to upper screen
E5                PUSH HL        Stack the constant EA8D
CD7CEC            CALL CURSOR_DOWN Move upper cursor down if possible
E1                POP HL         HL = points to first byte of second line
```

```
1180EA                  LD DE,EA80      DE ... points to first byte of
                                        first line
014000                  LD BC,0040      BC ... number of bytes to
                                        move
ED80                    LDIR            Delete top line from
                                        L__TABLE

3E20                    LD A,' '        space
E8                      EX DE,HL        HL ... points to third line of
                                        L__TABLE
CD38EC                  CALL WIPE__LINE Erase last line
2100EA                  LD HL,EA00      HL ... points to start of
                                        third line of L__TABLE
0640                    LD B,40         B ... number of bytes in
                                        first two lines
2B              FR__LOOP DEC HL         Point to next byte along
BE                      CP (HL)         Is it a space?
2003                    JR Z,FR__CURSOR Jump forward if not
10FA                    DJNZ FR__LOOP   Try again for next byte
2B                      DEC HL          HL ... EA7F
23              FR__CURSOR INC HL       HL ... new address of
                                        cursor
7D                      LD A,L          A ... low part of the
                                        address
32B19C                  LD (L__CURSOR),A Store new cursor position
C9                      RET
```

Next we have the NEW PARAGRAPH routine — this is what happens when you hit the ENTER key. See if you can follow it.

```
                        ORG ED2E
CD00E8  ENTER           CALL COMPRESS   Delete unwanted spaces
21C0EA                  LD HL,EAC0      Point HL beyond all text in
                                        L__TABLE
3E20                    LD A,' '        space
2B              E__CHECK DEC HL         Point to next character
BE                      CP (HL)         Is it a space?
28FC                    JR Z,E__CHK     Loop back if so
7D                      LD A,L          A ... low part of address of
                                        last (non space) character
                                        in file
FEA0                    CP A0           Is it on the first line?
D4FAEC                  CALL NC,PROCESS__1 If not then process one line
                                        from the lower part to the
                                        upper part of the screen
CD00E8                  CALL COMPRESS   Now delete any excess
                                        spaces generated by the
                                        above instruction
C0FDEC                  CALL PROCESS__2 Copy final part of
                                        L__TABLE to screen but
                                        without altering the right
                                        hand margin
CD88EC                  CALL CLEAR__LINE Make one blank line below
                                        paragraph
2AAF5C                  LD HL,(U__CURSOR) HL ... address of upper
                                        cursor position
3680                    LD (HL),80      solid space
                                        The program will later
                                        recognise this as an end of
                                        paragraph marker
2100EA                  LD HL,EA00      HL ... points to first byte
                                        (now blank) of L__TABLE
0603                    LD B,03         B ... number of spaces to
                                        indent start of next
                                        paragraph
3680            E__INDENT LD (HL),80    solid space
                                        The paragraph is indented
                                        with solid spaces which will
                                        not be deleted by the
                                        COMPRESS subroutine
23                      INC HL          Point to next byte
10FB                    DJNZ E__INDENT  Repeat for three spaces.
FD7577                  LD (L__CURSOR),L Store indented cursor
                                        position
C37DEC                  JP CURSOR__DOWN Move cursor down below
                                        blank line and exit
```

That was a mouthful wasn't it? Our table continues now with a table of addresses. This will be used later on by the program when it works out what subroutine it wants to call.

```
                        ORG ED8E
89EC    CTRL__TABLE     DEFW CLEAR__LINE
4DEC                    DEFW CLEAR__SCREEN
A7EC                    DEFW CAPS__LOCK
93EC                    DEFW EDIT
58EC                    DEFW CURSOR__LEFT
93EC                    DEFW CURSOR__RIGHT
7CEC                    DEFW CURSOR__DOWN
B0EC                    DEFW CURSOR UP
C1EC                    DEFW DELETE
2EED                    DEFW ENTER
1EEE                    DEFW YOURS
B0EC                    DEFW COPY__13
```

And now for the moment you've all been waiting for — this is the program which ties all those subroutines together into one unified program. *When you call the program from BASIC this is the address you must refer to.* This is the very start of the program headings. Note that because the program at one point relies on the value of the system variable SEED being fairly random this you shouldn't really use RAN DOMISE USR 60790. Instead you can always use RAN DOMISE 0*USR 60790 or L—USR 60790 or even m own favourite little quirky odd IF USR 60790 THEN (wi nothing after the word THEN Anyway here it is — this where it's all at!

```
                        ORG ED7E
218050  START           LD HL,5080      This is the print position of the
                                        start of the twelfth line on
                                        the screen
22B45C                  LD (DFCC),HL    Set print position
21211B                  LD HL,1B21      Define coordinates as start of
                                        line
22BA5C                  LD (SPOSN),HL   Store coordinates
FD3603D4                LD (IY+2D),D4   Specify lower screen four lines
                                        wide
FD360201                LD (TVFLAG),01  Direct PRINT to lower part of
                                        screen
0E80                    LD C,80         B ... number of bytes in lower
                                        part of screen
3E30    ST__LOOP        LD A,'0'graphic A
D7                      RST 10          Print border subroutine to give
                                        display
10FB                    DJNZ ST__LOOP
CD40EC          LOOP    CALL CLEAR__SCREEN Clear screen and set up to see
18                      JR ...          We ... 1
```

The next bit is the main loop. Every time an action is carried out control will return to this point. The first things is to scan the keyboard. Let's see how it goes.

```
                        ORG ED84
FDCB01AE LOOP           RES 5,(IY+01)   Signals 'no key pressed' test begins
CDEFEE                  CALL TRANSFER__L Display the result of the last
                                        action
FDCB016E L__WAIT        BIT 5,(IY+01)   Test has new key been pressed
28FA                    JR Z,L__WAIT    Wait until new key pressed or
                                        (Note: this is not an infinite loop
                                        since the keyboard scanning
                                        procedure is done by the ROM
                                        interrupt routine)
                                        A ... INKEY$ (effectively)
3A05SC                  LD A,(LAST__K)
FEC7                    CP 'symbol shift Q'  Symbol shift Q is interpreted as
                                        paragraph reform command
28 3B                   JR Z,REFORM
FECB                    CP 'symbol shift W'  Return to BASIC if 'symbol shift
                                        W' pressed
C8                      RET Z
FEC8                    CP 'symbol shift E'
2002                    JR NZ,L__1
3E7F                    LD A,'©'        Symbol shift E becomes the
                                        copyright symbol
FEAC    L__1            CP 'symbol shift I'
2002                    JR NZ,L__2
3E80                    LD A,' '        Symbol shift I becomes the
                                        graphic ' ' character
FE20    L__2            CP 20
300F                    JR NC,L__3      Jump forward unless control
                                        character is given
                                        Multiply code by two.
87                      ADD A,A         The quantity FF is CTRL TAB
C65A                    ADD A,5A        minus 0E
6F                      LD L,A
2BE0                    LD H,E0         HL ... points to address of
                                        subroutine to call
5E                      LD E,(HL)
23                      INC HL
56                      LD D,(HL)
                                        DE ... address of subroutine to
                                        call
EB                      EX DE,HL        HL ... address of subroutine to
                                        call
CD2C18                  CALL (HL)       Call the required subroutine
18CA                    JR LOOP         And re-join main loop
```

Note: The instruction CALL (HL) is not strictly speaking a true machine code instruction. It CALLS a subroutine in the ROM consisting of the single instruction JP (HL). Think about it.

```
8081          CP81
3808          JR C,L..3
                                  ..ed
              L..r.....SYMBOL.S..
              LEI.I.A.....ROM
              B.....q.e.number
              L.....character
216A02        LD HL,02BA
A5            LD B,L
B081          CPIR
79            LD A,L
D627          SUB 25
87            LD L,A
                                  HL.....
7E            LD A,(HL)
CDD7EC  L..4  CALL CHARACTER      A=1.....(ALL)
0008          L...h
```

This next section is the PARAGRAPH REFORM function and it is this which makes our wordprocessor so powerful. To change a word or phrase just use EDIT to get the appropriate line make the change and then without moving the upper cursor press symbol shift Q and the whole paragraph will be reconstructed before your eyes. This is the machine code that performs that task

```
                  ORG EDDE
1  L.h..REFORM    LD DE,EACO        P..E.DE.ey.nd.at.es
                                    L...TABLE
1B       R.END    DEC DE            Point.t.next.by.e
1A                LD A,(DE)         A...next.character.nt.y
FE20              CP.space
28FA              JR Z,R..FIND      L..p.back.until.n.space
                                    character.found
3                 INC DE            Ske..ver.h.CR
3                 INC DE            Skip.over.f..ll.wine.about
2AAF5C            LD HL,(U..CURSOR) HL...point.s.to.addr...L..r
                                    cursor
C12000            LD BC,0020        BC...number.of.ty
                                    line
FD..              LOOP              Append.next.s..t.cursor
                                    to.new.line
                  LOOP
LDDDEB            ALL COMPLESS      Delete.all.known.n..l
21EFEA            LD DE,EACO        Point.HL.us..key.n..L...TABLE.r
3E20              LD A,.space
28       R.END    DEC HL            P..nt.L..s.k.dy.to
BE                CP (HL)           ..s.a.space
28FC              JR Z,R..END..2    L..p.back.until.n.space
                                    character.found
                                    A...l.w.p..t.d.duc...
                                    character.n.nt.t.
7D                LD A,L
FEAD              CP ACO
3815              JR C,..EXIT       Jump.f.w..p..t
                                    line
                                    P..ocess.ne..line.and.r..t.
                                    upper.sc.een
CDFAEC            CALL PROCESS..L
2AAF5C            LD HL,(U..CURSOR) HL...new.address.of.oppo
                                    site
7E                LD A,(HL)
FE00              P..s.ld.save.e    T..t.for.end.of.paragraph
2800              JR Z,..EXIT       Exit.if.end.of.paragraph.found
11100EA           LD DE,EA60        DE...lowest.allowable.p..s
                                    f..cursor
A7                AND A
ED52              SBC HL,DE
2805              JR Z,..EDIT       Ex..t.if.at.t..lowest.p..s
1809              R.EFORM           Repeat.from.s..t.L..
CDEEED  R.Ext     CALL ENTER        T..st.as.end.f.p..ty.up
C3B46D            JP LOOP           And.back.ag..n.for.n..t
```

The next final piece of machine code is somewhere in your head. What would you like a word processor to do that this one doesn't? This subroutine is YOUR subroutine. It will be carried out every time symbol shift and caps shift are pressed simultaneously. You could for instance then wait for a further key and offer a choice of different functions. Or maybe there's just one function you want to add. Whatever you choose this one is truly up to you. It's all yours.

Editor's note

We would like to point out that Toni Baker's excellent book 'Mastering Machine Code on Your Spectrum', recently published, is in no way connected with this series which has been specially written for ZX Computing.

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Countdown

Now you can play TV's popular game with your friends and your micro — thanks to Ben Rimmer who hails from Suffolk.

This game is for two players who take it in turn to choose nine random letters (consonants and vowels) which are displayed on the screen. When the music starts the players have 30 seconds in which to try and form as long a word as possible from the letters displayed. When the music ends the letters disappear and the players must stop and enter the number of letters they have used and their scores. When the match has come to an end the overall winner is announced.



```
  1 REM  COUNTDOWN
  2 BORDER 3  PAPER 6  CLS  IN
PUT "How many games would you li
ke ? ";s
  3 LET z=0  LET y=0
  4 BORDER 2  PAPER 3  INK 7  C
LS
  6 PRINT AT 1 10; "Countdown"
  7 INPUT "Who is playing "; n$,
n$
  8 FOR f=1 TO s  PRINT AT 1,10
; "Countdown"
  9 LET a=10
 10 FOR n=1 TO 9  BORDER RND*6
 11 IF n=10 THEN GO TO 70
 12 INPUT "Consonant or Vowel(?)
C or V)";c$
 20 LET a$="bcdfghjklmnpqrstvwx
yz"
 25 LET b$="aeiou"
 30 IF c$="v" THEN GO TO 62
 31 IF c$="" STOP " THEN STOP
 32 IF c$<>"v" AND c$<>"c" AND
c$<>" STOP " THEN GO TO 12
 40 LET x=INT (21*RND)+1
 50 PRINT AT 11,a;a$(x)
 55 LET a=a+1
 56 PAUSE 20
 60 NEXT n
 61 IF n=10 THEN GO TO 70
 62 LET x=INT (5*RND)+1
 63 PRINT AT 11,a;b$(x)
 64 LET a=a+1
 65 PAUSE 20
 66 NEXT n
 70 FOR n=1 TO 7
 80 BEEP 0.2,1  BEEP 0.1,1  BEE
P 0.2,13  BEEP 0.1,1  BEEP 0.2,1
3
 90 BORDER RND*6  NEXT n
100 BEEP 0.2,1  BEEP 0.1,1  BEE
P 0.2,13  BEEP 0.1,1  BEEP 0.1,1
3  BORDER RND*6
110 BEEP 0.1,13  BORDER RND*6
150 FOR n=1 TO 7
160 BEEP 0.2,3  BEEP 0.1,3  BEE
P 0.2,15  BEEP 0.1,3  BEEP 0.2,1
5
170 BORDER RND*6  NEXT n
180 BEEP 0.2,3  BEEP 0.1,3  BEE
P 0.2,15  BEEP 0.1,3  BEEP 0.1,1
5  BORDER RND*6
190 BEEP 0.2,15
200 FOR n=1 TO 8
210 BEEP 0.2,3  BEEP 0.1,3  BEE
P 0.2,15  BEEP 0.1,3  BEEP 0.2,1
5
220 BORDER RND*6  NEXT n
230 FOR n=1 TO 150  BORDER RND
6  NEXT n
240 FOR n=1 TO 2
250 BEEP 0.2,3  BEEP 0.1,3  BEE
P 0.2,15  BEEP 0.1,3  BEEP 0.2,1
5
260 BORDER RND*6  NEXT n
270 BEEP 0.1,15  BEEP 0.1,13
OR n=1 TO 20  NEXT n  BEEP 0.1,
 BEEP 0.1,10  FOR n=1 TO 20  N
XT n  BEEP 0.1,3  BEEP 0.1,2
EP 0.1,3  BEEP 0.1,6  BORDER RN
*6
272 PRINT AT 11,10,"
275 PAUSE 0
276 PRINT TAB 6; "What i
 score?"  INPUT c
277 PRINT TAB 6; "What did
 score?"  INPUT b
278 LET y=y+c  LET z=z+b
279 CLS
280 NEXT f
285 CLS  PRINT AT 11,10,n$
cored ";y  PRINT AT 12,10,n$
cored ";z
290 IF y>z THEN PRINT TAB 12
," won!"
300 IF y=z THEN PRINT TAB 10,
Dead heat!"
310 IF z>y THEN PRINT TAB 10
" won!"
320 PAUSE 0
330 RUN
```

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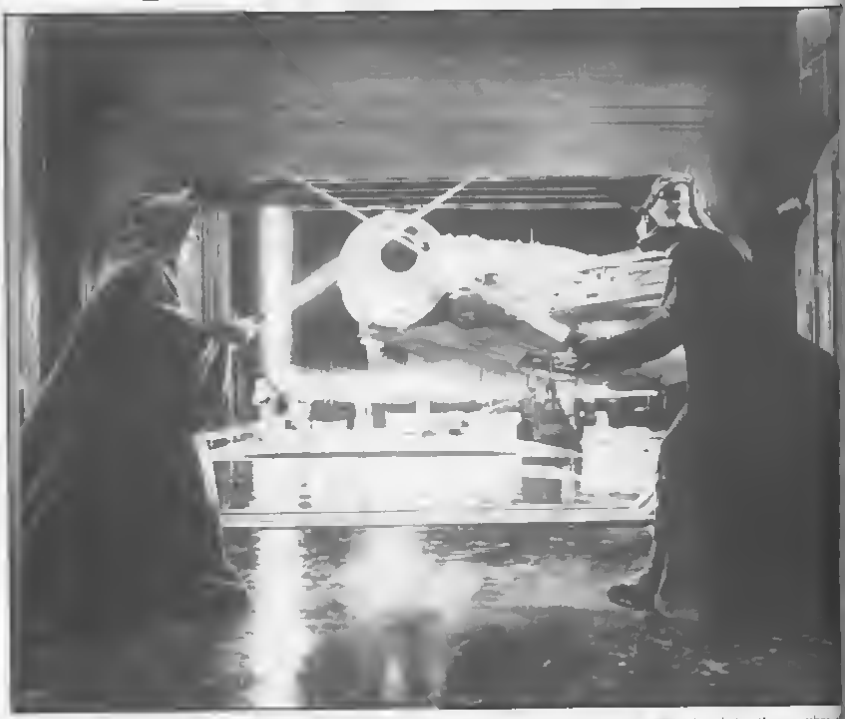
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Home base



Get back home as soon as you can in this program for the Spectrum, courtesy of David Naylor of Leeds.

The object of this game is to move your spacecraft from the bottom left hand corner of the screen to the top of the screen your home base. However there are two problems you will encounter. Firstly the gateway through which you can escape to your home base is getting smaller as you progress up the screen. And also there are a number of obstacles which get in your way.

On the level

Once the program has been entered and RUN you are given scoring and skill level instructions and which keys you use to move. If you do not press a key your spacecraft will always move forward and you score points for moving forwards left and right. There are certain objects scattered around the screen, such as shooting stars power packs and flying saucers for which you will gain extra points if you collect them. You can also gain extra lives should you collect these objects but you can only achieve a total of nine lives.

There are seven skill levels the level of the game is displayed at the top of the screen along with the score the high score the amount of time you have left and the number of lives you have left. The skill level is related to the number of obstacles you have in your path and the time you have left to get through the gateway at the top of the screen before it completely closes.

The gateway to your home base will close bit by bit until it completely closes thus trapping you in the playing area. The rate at which this happens is related to the main playing loop — so the longer you stay in the playing area collecting more points the more difficult it is to get back to your home base.

One special feature included in this program is the one for choosing the skill level you will to start on. You can either choose the level you start on and

specify a new level when you have completed your mission. Or you can choose to start at level one and progress through the subsequent levels (assuming you manage to do that) automatically.

One little problem I ran into when writing this program was that I had related the closing of the gateway at the top of the screen to the number of points you have. Thus in some of my earlier versions of the game when you went onto a second level having completed the first the computer looked at the score you had amassed and shut the gateway instantly not giving you a chance at all. Therefore, I included the variable SCS which holds your score from previous rounds and is added onto the score you gain from each level. Thus while you play each level your score is reset to zero so that the gateway to your home base does not close before you move.

Variables

HI	The high score
SCS	The scores
SC	The score from each individual level
L	The number of lives you have
DI	The level of difficulty you have chosen
I$	The type of difficulty set on that level
S and K	Random numbers used for the initial plotting
W	The main loop and time allowed
X	The random number used in the closing of the gateway
C and R	These are used for plotting the spacecraft movement
Z and X	These are used for plotting the obstacles in the main program loop
N	Used (in graphics mode) for the spacecraft's user defined graphics

Line by line

Line 5	Fixes the user defined graphics
Lines 45 80	Provides the instructions and inputs
Line 90	Fixes the number of lives you have
Lines 115 158	Deal with the initial plotting of the obstacles
Lines 160	Sets up the initial position of the spacecraft
Lines 170-190	Print the special objects to be collected at random positions
Line 210	Prints the destination of your spacecraft
Lines 295 500	Contain the main loop of the program. The length of the main loop is determined by the skill level and thus then counts as the time allowed to complete the level (variable W)
Line 303	Prints the new position of the spacecraft
Lines 323 345	Close the gateway to the home base with random number X
Lines 349 385	Control the movement of the spacecraft
Lines 369 376	Scan the position of the spacecraft to see what is there. Touching the home base barrier destroys you immediately
Line 379	The computer already knows if you have touched the home base barrier and has dealt with it. Therefore this line sends you to line 2000 if you have reached the top of the screen
Lines 380 392	Choose the random numbers (X and Z) and plot an obstacle at the points X and Z. They also make sure nothing is printed over the various displays at the top of the screen
Lines 1000 1005	If you run out of lives and crash this prints a final message accompanied by a series of BEEPs
Lines 1010-1030	Ask you if you want to play again and check to see if the high score facility needs altering to a higher number
Lines 1100 1115	Tell you if you have run out of time and then goes to line 1010 to see if you want to play again
Lines 2000 2060	Tell you when you win, print the SCS score, check what type of game you are playing and direct the program to line 80 or 90 if you are progressing from level to level up to level seven. You will receive a special message
Lines 3000 3020	Tell you when your score gets too high and the home base disappears. The program is then directed to line 1010 to see if you would like another game
Lines 5040 6000	Set the user defined graphics
Lines 7000 7400	Provide instructions on scores and lives from lines 369 376

Points to note

After entering the program you can save the program using the following

SAVE "HOME BASE" LINE 5

If you touch a key during the initial setting up of the obstacles, when the plotting is finished the PAUSE 0 in line 240 will exit operate and the game will begin immediately.

Finally don't get too worried if on the higher levels you are boxed in by obstacles as soon as you start as you should have enough lives in hand to be able to cross a few obstacles you only lose one life each time you go over an obstacle. Be sure to plan your route through the obstacles before you start the game through.

```
   1 REM HOME BASE
   5 GO SUB 5050 : GO TO 8
   8 PAPER 7 : CLS
  10 LET HI =0
  15 LET SCS=0
  45 REM instructions
  49 PRINT AT 21,6; BRIGHT 1;"DA
VID NAYLOR  1983"
  50 PRINT AT 9,0; INK 1; BRIGHT
1;"H * O * M * E   B * A * S
* E"
  52 FOR R=1 TO 20 : BEEP .05,R
BEEP .01,R+10 : BEEP .001,R-20 : N
EXT R
  65 PAUSE 60 : CLS : PRINT AT 0,
0;"SCORING
    2,4,6,8,10,12,14pts depending
 on level for moving forwards
                    left
                    right
     50pts for a shooting star(*)
           for a star(.)
    100pts for a power pack(@)
    150pts for a flying saucer(+)
    200pts on completing return

    SKILL LEVELS
    1...50*(  ) ,350 secs
    2...100*(  ) ,175 secs
    3...150*(  ) ,113 secs
    4...200*(  ) , 85 secs
    5...250*(  ) , 70 secs
    6...300*(  ) , 58 secs
    7...350*(  ) , 50 secs"
  72 PRINT AT 21,9;"PRESS R KEY"
  PAUSE 0 : CLS : PRINT AT 5,0;"U
SE
0' FOR LEFT
9' FOR RIGHT
1'FOR DOWN
YOU MOVE FORWARDS AUTOMATICALLY"

  75 PRINT AT 21,5;"PRESS R KEY
TO START" : PAUSE 0 : CLS
  77 INPUT "IF YOU WISH SKILL L
EVELS TO BUILD UP AUTOMATICAL
LY (1 TO 7), THEN PRESS 'a'.";I$
  78 IF I$="a" THEN LET DI=1 : GO
TO 88
  80 INPUT "LEVEL OF DIFFICULTY (
1-7)";DI
  85 IF DI<1 OR DI>7 THEN GO TO
80
  88 LET SC=0
  90 LET L=DI+2
  95 IF L>9 THEN LET L=9
 102 BORDER 1 : PAPER 4 : CLS
 115 REM initial plotting
```

```
 120 PRINT AT 0,9,"PLEASE  WAIT"
 140 FOR Q=0 TO 50*DI
 145 LET S=INT (RND*31)  LET K=I
NT (RND*21)+3
 147 IF K>21 THEN LET K=21
 150 PRINT AT K,S,"X"
 152 BEEP .05,RND*50
 153 IF Q=50*DI THEN GO TO 160
 155 PRINT AT 21,0," "
 158 NEXT Q
 160 LET R=21  LET C=0
 170 PRINT AT RND*17+3,RND*31,"D
"
 175 PRINT AT RND*17+3,RND*31,".
"
 180 PRINT AT RND*17+3,RND*31,"+
"
 190 PRINT AT RND*17+3,RND*31,"*
"
 205 PRINT AT 0,5,"PRESS RNY KEY
 TO  MOVE"
 210 PRINT AT 2,0," M * O * M *
E  B * R * S * E  "
 235 PRINT AT R,C,"N"
 240 PAUSE 0
 250 PRINT AT 0,0,  INVERSE 1,"
                              "
 290 PRINT AT R,C," "
 295 REM set up loop
 300 FOR U=1 TO INT 350/DI
 302 IF U=INT 350/DI THEN GO TO
1100
 303 PRINT AT R,C,"N"
 304 IF L>9 THEN LET L=9
 306 REM scoring/timing/lives
 307 PRINT AT 0,26, INVERSE 1,"L
IVES ";L
 309 PRINT AT 0,12,"LEVEL ";DI
 312 PRINT AT 0,0,  INVERSE 1,"SC
ORE ";SC
 313 IF HI <SC THEN LET HI = SC
 316 PRINT @2, INVERSE 1,"HI SCO
RE ";HI
 320 REM random gate close
 323 LET X=INT (RND*10)
 325 IF X<2 THEN GO TO 323
 330 IF SC>20*X THEN PRINT AT 2,
0, INK 2, "■■■■",AT 2,26,  INK 2,"
■■■■"
 335 IF SC>30*X THEN PRINT AT 2,
4, INK 2, "■■■ ",AT 2,25,  INK 2,"
■■■ "
 340 IF SC>90*X THEN PRINT AT 2,
7, INK 2, "■■ ",AT 2,23,  INK 2,"■■
 "
 342 IF SC>120*X THEN PRINT AT 2
,9, INK 2, "■ ",AT 2,22,  INK 2,"■
 "
 343 IF SC>150*X THEN PRINT AT 2
,10, INK 2, "■■■ ",AT 2,19,  INK 2,
"■■■ "
 344 IF SC>220*X THEN PRINT AT 2
,13, INK 2, "■■ ",AT 2,10,  INK 2,"
■■ "
 345 IF SC>200*X THEN PRINT AT 2
0, "■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■"
 PAUSE 200  GO TO 3000
 348 PRINT AT R,C," "
 349 REM moving
 350 IF INKEY$="9" THEN LET C=C-
1  LET SC=SC+(DI*2)
 355 IF INKEY$="1" THEN LET R=R+
1
 360 IF INKEY$="0" THEN LET C=C+
1  LET SC=SC+(DI*2)
 362 IF INKEY$="" THEN LET R=R-1
  LET SC=SC+(DI*2)
 365 IF R>20 THEN LET R=21  IF C
<0 THEN LET C=0  IF C>30 THEN LE
T C=31
 369 REM position scan
 370 IF SCREEN$ (R,C)="0" THEN G
O TO 7000
 371 IF SCREEN$ (R,C)="." THEN G
O TO 7100
 372 IF SCREEN$ (R,C)="+" THEN G
O TO 7200
 373 IF SCREEN$ (R,C)="*" THEN G
O TO 7300
 374 IF SCREEN$ (R,C)="X" THEN G
O TO 7400
 375 IF SCREEN$ (R,C)="<" THEN G
O TO 1000
 376 IF SCREEN$ (R,C)=">" THEN G
O TO 1000
 377 PRINT AT 1,16,  INVERSE 1,"T
IME GONE ";U
 379 IF R=2 THEN GO TO 2000
 380 REM rnd. plotter
 381 LET X=INT (RND*31)
 385 LET Z=INT (RND*21)
 390 IF Z<5 THEN GO TO 380
 392 PRINT AT Z,X,"X"
 395 IF R<2 THEN LET R=2
 500 NEXT U
1000 REM lives gone/hit somethin
g/time gone
1001 PRINT AT 10,9,  FLASH 1,"YOU
'RE DEAD!!!"
1005 FOR R=0 TO -20 STEP -1  BEE
P .05,R  NEXT R
1010 CLS  PRINT AT 10,9,"AGAIN?
(Y OR N)"
1015 INPUT R$
1018 IF HI<SC5 THEN LET HI=SC5
1020 IF R$="Y" OR R$="y" THEN LE
T SC5=0  CL5  GO TO 77
1030 STOP
1100 PRINT AT 10,6,  FLASH 1,"YOU
 RAN OUT OF TIME!"
1110 FOR R=0 TO 25  BEEP .01,R-1
0  BEEP .01,R+10  NEXT R
1115 GO TO 1010
2000 REM reached home
2001 LET SC=SC+200  PRINT AT 10,
6,  BRIGHT 1,"YOU'VE DONE IT!!"
2002 FOR R=1 TO 3  FOR S=1 TO 20
2005 BORDER RND*6  PAPER RND*6
2010 BEEP .05,S  NEXT S  NEXT R
2015 CLS  LET SC5=SC5+SC
2018 IF HI <SC5 THEN LET HI =SC5
2020 IF L$<>"a" THEN GO TO 2035
2025 LET DI=DI+1  IF DI<7 THEN G
O TO 2035
2030 PRINT AT 10,7,  PAPER 7, INK
 4,  FLASH 1;"YOU'RE THE GREATEST
!!!"  PAUSE 50  PRINT AT 15,6,"Yo
ur final score is ",SC5  LET SC5
=0  PAUSE 200  GO TO 1010
2035 PRINT AT 10,0,  PAPER 7, FLA
SH 1,"Your score is:",SC5  PAUSE
 200
2045 LET SC=0
2050 PAPER 7.  CL5  IF L$="a" TH
EN GO TO 90
2360 GO TO 80
3000 REM base disappeared
3001 PRINT AT 10,0,  FLASH 1,"TOO
 SLOW, YOUR BASE  DISAPPEARED"
3010 FOR A=1 TO 30  BEEP .01,1+2
0  BEEP .01,A-30  NEXT A
3020 GO TO 1010
5040 REM space craft(N) U.D.G,s
5050 FOR L=0 TO 7
5053 DATA 24,60,125,256,126,60,2
4,0
5055 READ N  POKE USR "N"+L,N
5060 NEXT L
5000 RETURN
7000 LET SC=SC+100  LET L=L+1  S
OUND .01,30  GO TO 371
7100 LET SC=SC+50  LET L=L+1  BE
EP .01,20  GO TO 372
7200 LET SC=SC+150  LET L=L+1  S
OUND .01,10  GO TO 373
7300 LET SC=SC+50  LET L=L+1  BE
EP .01,40  GO TO 374
7400 LET L=L-1  BEEP .01,50  IF
L=0 THEN GO TO 1000
7401 GO TO 375
```

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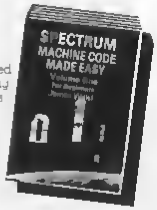


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The ZX81 soft selection

Nick Pearce looks over the latest (and some of the greatest) software available for the ZX81

Two new cassettes feature in this article together with re-reviews of three popular cassettes to give new ZX81 owners an insight into the software available for their machines. All the cassettes are for the ZX81 with 16K RAM.

Alpharobe —Artic Computing

Alphaprobe is a new game from Artic to add to the already impressive range of software marketed by that company. It is an interactive game in real time in which, as commander of the NSS Alphaprobe, your mission is to explore strange new planets. You are transported by the mothership into alien skies and dropped toward the planet surface. The object of the game is to guide your descending ship and land safely on the planet, to reach fuel dumps and replenish supplies and to launch pads to be taken to new planets. The game ends if you run out of fuel or crash and you are awarded a score at the end of each game.

There are five grades of difficulty — at the hardest level you also have to contend with dangerous spores in the skies above the planets and, as a different planet surface is generated for each game, the game is different every time.

However, Alphaprobe is not a particularly inspired game. It runs well and should be fairly readily mastered — but do keep an eye on the fuel level. I also thought that the screen displays were somewhat primitive for a game of this sort.

Alphaprobe costs £3.95 and is available from Artic Computing Ltd, Main Street, Brandesburton, Driffield, YO25 8RG.





Dominoes —Phipps Associates

Dominoes is the product of another well established company with a good track record, Phipps Associates, and a good simulation it is too.

Particularly impressive is the screen display. You play against the computer and your hand is displayed on screen throughout the game together with the current scores, the 'end' dominoes and a record of the dominoes played.

The winner is the first player to score 72 points — scoring following the traditional 'divisible by three or five' rule. Watch out — the computer plays an intelligent game and is not easily beaten.

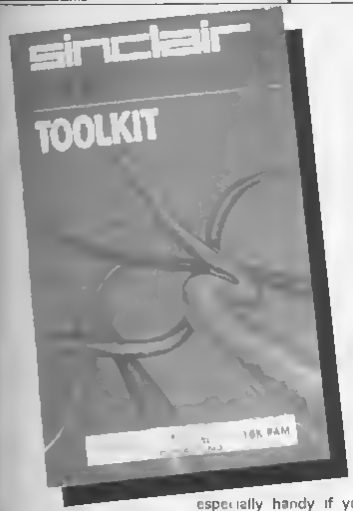
My only criticism is that the computer can take some time to respond and it can be frustrating having to wait for the necessary screen update. As it is a lengthy program, LOADing time is also protracted. However, Dominoes is an enjoyable game and proves a good opponent.

Dominoes costs £4.95 from Phipps Associates, 172 Kingston Road, Ewell, Surrey KT19 0SD.

Toolkit —Artic Computing

Toolkit provides a total of nine functions to ease the labour of program writing. After LOADing, it automatically lowers RAMTOP and sets itself up in the last 2¼ K of memory. This is a definite advantage over some other toolkits which require the user to reset RAMTOP before loading — something that can easily be forgotten.

Toolkit's facilities are obtained through USR calls.



Prompts are given on the screen and the program is fairly straightforward to use Special error codes are given to identify the problem if anything goes wrong The original review cassette contained closely typed instructions on one side of a sheet of A5 size paper Artic have since improved the packaging and presentation and the instructions are now included on an attractive insert card

In common with other utilities of this sort Toolkit features a very useful renumber routine but Artic s is both quick and easy to use The program also contains an impressive range of other programming aids including facilities to delete groups of lines to display the amount of memory available to list the current variables of all string and numerical variables (except arrays and loop control variables) and find any string up to 255 characters in length and list every line in the program containing that string

The replace command allows any string to be replaced by any other string — eg PRINT can be replaced by LPRINT throughout a program By saving the current program below RAMTOP another program can be loaded allowing two programs to be joined

Another useful function is REMKILL which removes all REM statements This is especially handy if you are running short of memory or want to speed up LOADing or SAVEing

This must be one of the better toolkits around for the ZX81 It is easy to use executes commands quickly and accurately, and all its functions are likely to have some value for both the novice and for the more experienced BASIC programmer Toolkit takes up only 2K of memory and is quickly loaded which is pretty impressive considering the range of functions available

a highly recommended cassette

Toolkit costs £5 95 and is available from Artic Computing Ltd, Main Street, Brandesburton, Driffield YO25 8RL

Vufile — Psion

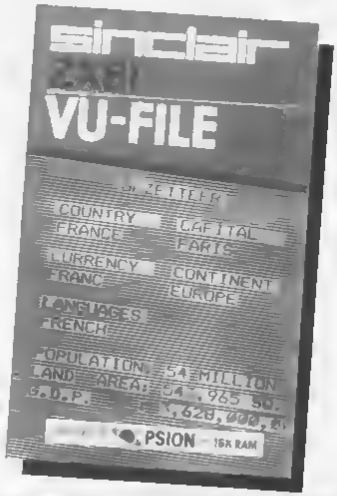
Another popular program for the serious user Vufile is a general purpose filing program produced by Psion and included in the Sinclair software range It is the sort of program you could use to catalogue your coin or stamp collection, keep a name and address list of friends or for business maintain a record for your club or society or even keep a file record of all your ZX81 software!

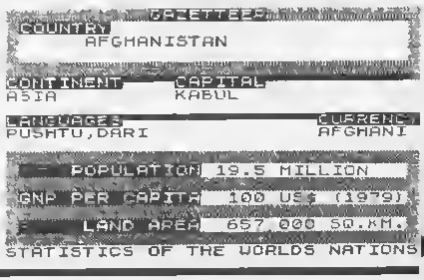
The program is logically displayed and easy to use To begin you lay out the record using headings, titles and graphics symbols Anything entered during this record layout mode will be shown on each record on the file Data is entered into the file from the main command mode As well as ENTER the other main commands are ALTER, INFORM FORWARD BACK RESET ORDER PRINT, COPY SELECT, QUIT LIST and DELETE Together they provide a comprehensive file handling capability and can be implemented simply by keying in just the first letter of each command

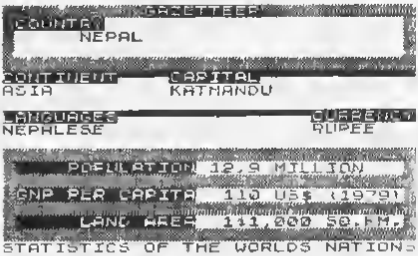
On the B side of the cassette is an example of an application for Vufile The program is called Gazetteer and is a file of records for every country in the world, giving its name its capital city, the main language and the like I made use of Gazetteer to get a feel for the manipulative and interrogative power of the main program

On the command LIST each successive record in the field is displayed for about one and a half seconds So I was able to select and view any country in the file almost immediately By using the FORWARD and BACKWARD commands you can step through the file RESET sends you to the first record ORDER defines the particular sequence required and INFORM gives the file status information

As an indication of the capacity of Vufile Gazetteer







holds records on 152 countries and uses 96% of the space available

There's only one complaint and that's not about the quality of the program which is very high indeed but the inconvenience of loading the files from cassette Few people would be prepared to wait for five minutes or more to load a file just to obtain the address of a friend or colleague The ZX81 really needs a disc operating system to enable it to be effective for this sort of work A version of the program is available for the Spectrum and with the Microdrive forms a useful and powerful file handling system

Nevertheless, Vufile is a very good program and does all that it claims to It certainly gave me a better understanding of how computers can be used for storing data and the power a computer system can offer

Vufile costs £7 95 and is produced by Psion, available from Sinclair Research Ltd Stanhope Road Camberley, Surrey GU15 3PS

Nowotnik Puzzle —Phipps Associates

Finally, a program that continues to tantalise since its release in 1982 The Nowotnik Puzzle is an original concept in computer games and requires the warped thinking of the Rubik Cube devotee to solve it

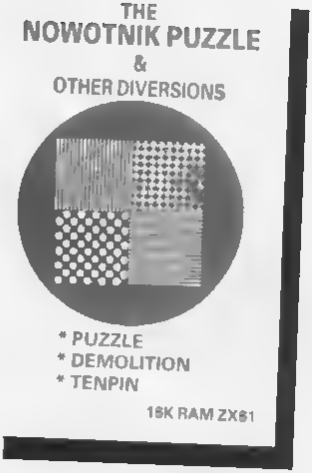
Whilst only two dimensional it is nevertheless frustratingly difficult to solve At the beginning and when (and if) completed the puzzle is in the form of four large squares These squares are shuffled by the computer using a random selection of eight possible movements and the idea of the game is to use these eight movements to get the four squarns back to their original layout At the simplest level each of the four largs squares is broken up into four by the shuffle giving sixteen smaller squares, at the hardest level the four squares are each divided into 144 pieces giving a total of 576 elements altogether!

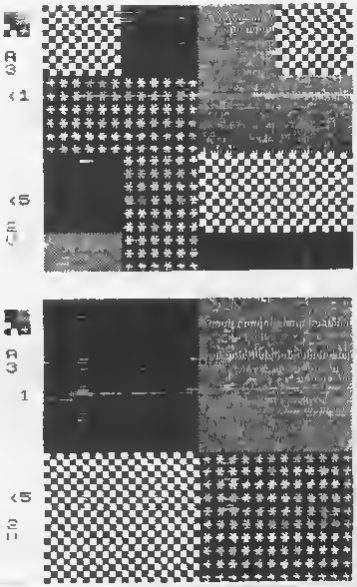
If you complete the puzzle you are told the number of moves taken There is also a game save facility so that a partly completed puzzle can be continued (and hopefully finished) sometime later I would have liked an option to reduce the number of shuffles so that a logical method of solution could be developed by trial and error during the first few attempts the sight of a well shuffled puzzle on the first attempt is itself rather daunting

Conceptually, the puzzle is similar to the dratted Cube but is relatively easy to complete one square (or face) but it is solving the whole puzzle without ruining what you have already accomplished that is so infuriatingly difficult.

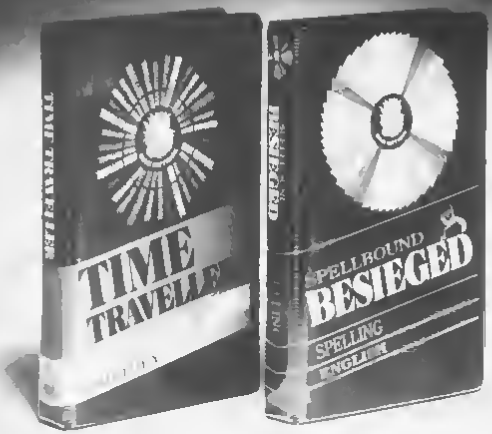
But also like the Cube the Nowotnik puzzle is an addictive game and with two other games included in the price (an interactive game called Demolition and a tenpin bowling simulation) this cassette is a very good buy

The Nowotnik Puzzle cost £5 00 and is available from Phipps Associates, 172 Kingston Road, Ewell, Surrey KT19 0SD





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The scene is set in the age of the Crusades: with gallant knights attempting to relieve a beleaguered city from the grasp of infidels

Every word you spell correctly helps one of your knights in their struggle. Spell a word wrong and the infidels will have the advantage

---

Both of these educational games are available for use on the ZX Spectrum and can be obtained from W H Smith, larger branches of Boots, or any good bookshop or computer store

Sulis Software

Sulis Software is marketed by John Wiley & Sons Ltd, Baffins Lane, Chichester, West Sussex PO19 1UD, England

ZXC meets Software

Ray Elder ventures into the West country to meet the faces behind the software.

Taunton main town of Somerset is steeped in tradition and yet alive with today s technology In a pleasant olde worlde house just off the town centre I was welcomed by Robert White the founder and sole proprietor of Durell Soft ware

In the top room where oak beams and computers seemed at ease with each other Robert a lively cheerful and interesting man who looks younger then his 30 years told me of the history of his small but rapidly expan ding company

Having already qualified as an art teacher Robert then did a degree in quantity surveying After a year however he found the course boring and decided to specialise in using computers graduating with an Honours First He then started working for Oxford Health Authority as a CAD (Computer Aided Design) specialist for whom he still works as a consultant

Working on a large computer called the Building Design System Robert models buildings in 3D specialising in graphics and measurements — a facet of computing which is often forgotten in the glut of home computing hysteria One of his designs is reproduced here with permission from Applied Research of Cambridge

Robert also showed and ex plained the General Drafting System which stores data for things like maps and can display them at different sizes and scales including or omitting details as appropriate

After three extremely in teresting years with Oxford Health Authority Robert decid ed to leave in order to write pro grams of his own rather than im plement architect s designs He set up shop in Taunton in February with an aim of produc ing software for the Oric which had just been released This he did taking two months to write an assembler and dissassembler in BASIC

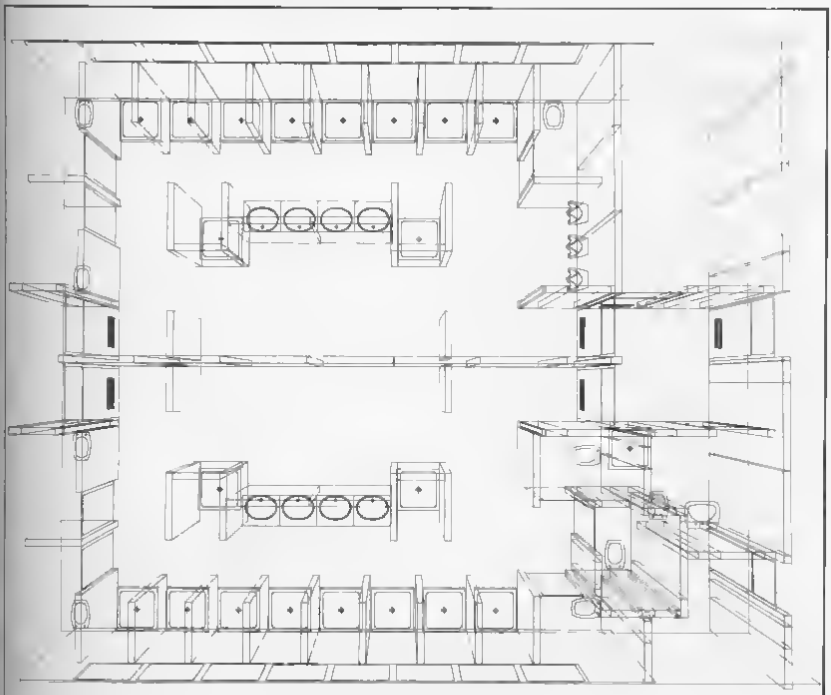
His next program Lu Lander/Asteroids was a written in BASIC with the intention that it SHOULD listed and it was full of REM explain its operation so that grammers could learn from

It was at this stage Robert began to consider ad tising in computer maga and realised that to make effective he needed to inv other programmers in orde expand his range of tapes advertisement in the local produced four quality Mach Code programmers one whom was Mike Richardson unassuming 26 year old M wrtes the Spectrum softw



Mike Richardson and Robert White hard at work on their next success!

Durell



Plotted graphics of components assembled in 3D from the 3D voxbox Module.

Diagram courtesy of Applied Research of Cambridge Ltd

and is regarded as the resident genius by Robert.

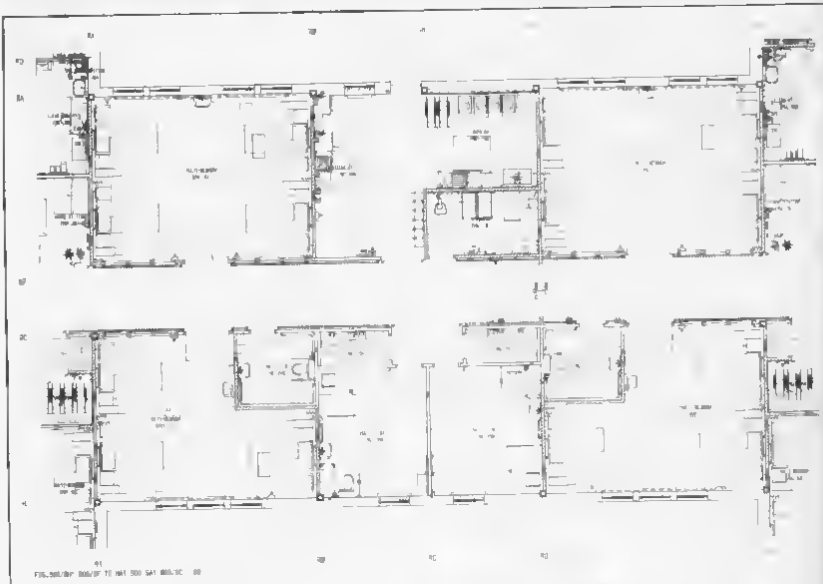
Robert supplied all his programmers with suitable machinery and briefed them with his current game idea — an aircraft arcade game which he called Harrier Attack. This became his first major tape for the Oric Spectrum Commodore and Atari and was a great success reaching number seven in the software charts.

Meanwhile Mike had been developing an idea of his own. Mike Robert himself and all his other programmers all work on a royalty basis as he is very much against the nine to five working system.

Although Robert was dubious about Mike's idea of a graphics adventure game set in the jungle, Mike produced Jungle Troubles and Robert happily confirms that it has been another success for them.

Scuba Dive is their latest game. Robert is very enthusiastic about it while Mike is quietly embarassed. From the brief preview I had of it, being taken through sections many players won't see for a long time. I was impressed with the quality of the graphics and animation — it must be another winner!

In general, Robert is aiming to produce multi-machine games moving away from the violent type of program and towards the area of family cartoon style game. The competition, especially from the companies who indulge in expensive advertising campaigns almost dissuaded Robert from producing Spectrum tapes and almost lost us some very high quality programs.

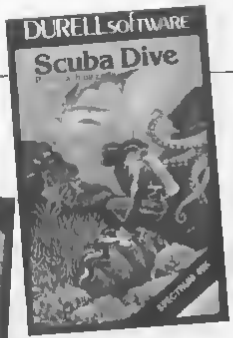


Plotted hospital ward layout, from the drawing module

Diagram courtesy of Applied Research of Cambridge Ltd







Put to the test

Harrier Attack Take off fly over sea and land defences to attack enemy installations on a nearby island and return You have rockets and bombs plus complete control over speed and height *Comment A good game well worth having and has an element of that elusive addictive quality*

Jungle Troubles Jump on t stepping stones to cross t crocodile infested river and your axe Climb a ladder an chop down the trees (thi monkeys don t help here!) th climb to the final level and swin across the fire pit to reach th last hurdle before reach home *Comment not eas Great cartoon type graphics*

Scuba Drive Swim dow through a selection of fri fiends locate a cave entran and explore the caverns coll ring pearls and treasur However some are dead end monsters abound the clams cl trap you and your oxygen s ning out Also your boat is mo ing so it may not be where yo left it when you want it! *Co ment As good as anyth around Superb graphics e cellent animation and very mu a just one more go gam*

Thanks to Paul Shelley 1 for his unbiased comments

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```
  1 LET sc=0: GO SUB 300: LET p=.1: PAPER 0: INK 7
  2 LET shs=6: LET p=p/1.3: IF p<0.0007 THEN  LET p=0.0007
  3 PRINT  AT 0,0;"@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@"
  4 PRINT  AT 1,0; CHR$ 137; CHR$ 140; CHR$ 134: PLOT  OVER 1;10,162: PLOT  OVE
R 1;14,162
  5 FOR j=1 TO 100
  6 PLOT  INK  RND *8; RND *255, RND *175
  7 NEXT j
  8 FOR q=0 TO 2: LET t=( RND *210)+20: LET l=( RND *130)+20: FOR h=1 TO ( RND
*4)+3: CIRCLE t,l,h: NEXT h: NEXT q
  9 FOR r=2 TO 15: BEEP .3,r: NEXT r: PLOT 0,0: DRAW 255,0, 1.2
 10 BORDER 0
 20 LET i=22593
 30 LET n=1
 40 LET x=22528+703-15
 45 PAUSE 50
 50 POKE x,56: POKE x-1,0: POKE x+1,0
 51 PRINT  INVERSE 1; AT 0,0;"SCORE=";sc
 55 IF n=703 THEN  BEEP 3,23: POKE 23609,0: PRINT  AT 21,10;"YUM YUM"; AT 20,0
;"you're dead'AAAAA"; AT 5,10;"Score:";sc; AT 10,0;"FINAL SCORE:"; AT 12,0;"Us(a
lien utd.),1 square block"; AT 14,0;"Them(the twit with the missiles:"; AT 15,29
;sc/10: STOP
 60 POKE i+n,56: POKE i+n-1,0: BEEP p,20
 62 IF  RND >.9 THEN  GO SUB 500
 65 IF  IN 63486=255 THEN  LET n=n+1: POKE 23618,50: POKE 23620,1
 70 IF  IN 63486=254 THEN  LET x=x-1: LET n=n+1: POKE 23618,50: POKE 23620,1
 80 IF  IN 63486=253 THEN  LET x=x+1: LET n=n+1: POKE 23618,50: POKE 23620,1
 90 IF  IN 63486=239 THEN  LET shs=shs-1: POKE 23610,150: POKE 23620,1
100 LET n=n+1: POKE 23618,50: POKE 23620,1
150 IF shs <= 0 THEN  POKE 23618,100: POKE 23620,1
```

STOP! Before typing in this program, please see the Editor's notes in the Welcome section.

```
151 FOR k=0 TO 31
160 IF  ATTR (21,k)=56 THEN  GO TO 180
170 NEXT k
175 POKE 23618,100: POKE 23620,1
180 FOR f=19 TO 0 STEP -1
190 PRINT  AT f,k;"A"; AT f+1,k;" "
192 BEEP  .02,f
195 IF  ATTR (f-1,k)=56 THEN  LET sc=sc+shs*10: LET shs=5: PRINT  AT f-1,k;" "
AT f,k;" ": PAUSE 70: LET n=1: BEEP 2,-10: POKE 23618,50: POKE 23620,1
197 NEXT f
200 POKE 23618,100: POKE 23620,1
300 FOR g=0 TO 7
305 READ s
310 POKE  USR "A"+g,s
320 NEXT g
330 DATA 24,24,24,24,24,126,90,129
335 RESTORE 400
340 FOR g=0 TO 7: READ s
350 POKE  USR "0"+g,s: NEXT g
360 DATA 34,62,28,28,8,8,62,42
400 DATA 34,62,28,28,8,8,62,42
410 RETURN
500 LET k= RND *255: PLOT k,170: DRAW 0,-160
505 FOR m=0 TO 30: NEXT m: DRAW  OVER 1;0,159
510 IF  ATTR (21, INT (k/8))=56 THEN  GO TO 800
515 RETURN
800 PRINT  AT 10,5;"SCORE:";sc; AT 15,0;"FINAL SCORE:"; AT 17,0;"us(alien utd
,1 square block", AT 19,0;"them";sc/10
```


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The Alphacom 32 Printer

Ray Elder takes a look at another way of getting into print at a reasonable price.

The first attempt to improve the listings in *ZX COMPUTING* was an investigation into an alternative printer. The Alphacom 32 is the American version of the Sinclair printer and is marketed in Britain by Dean Electronics. Originally priced at £99.95 it has now been reduced to £59.95 due to an exclusive distribution agreement.

In size it is nearly twice as deep and slightly longer than the ZX printer and looks an altogether sturdier machine (actual measurments are 19.4cm x 14.4cm x 7.5cm). The printer comes complete with connector, a roll of paper, instruction book and power supply unit. The PSU being used at the same time as the Sinclair PSU, it also uses all the Sinclair commands LLIST, LPRINT and COPY.

Having unpacked the unit from its attractive box and read the instructions, the next thing to do was connect it to the Spectrum (it is compatible with both ZX81 and Spectrum). The Alphacom connector is larger than the usual connector, having a bump which is flush with the top of the Spectrum when fitted, and a row of spring clips along the underside. These clips do not seem to have any practical use (probably an earthing connection on the American Timex machine) but you have to fit the connector carefully in order not to bend or break them. The connector has a good, tight fit and presented no problems.

Next step was to fit the paper to the machine. Thermal paper is used as on the ZX printer, but this is white unlike Sinclair's silver paper, and it produces a blue coloured print. Feeding the paper into the machine only took a few seconds and the roll then sits in a tray. It is not held on spindles like the Sinclair roll and this probably helps to keep the feed straight.

Two switches are provided on the printer, an OFF and an ON/ADVANCE switch — pressing both puts the printer into self test mode where it continually prints alternate lines of 1s and 0s.

OK, so what's it like in operation?

The first thing I noticed was how quiet it was. Being used to the ZX's strangulated croak, I was worried that it wasn't working! But as the print appeared the other immediately impressive feature became obvious — the speed of printing is much faster, two lines a second in fact.

For technical buffs I'll give the specifications:

Graphics at 60 dpi (256 x n)
Vertical line spacing, 6 lpi
Horizontal spacing, 10 cpi

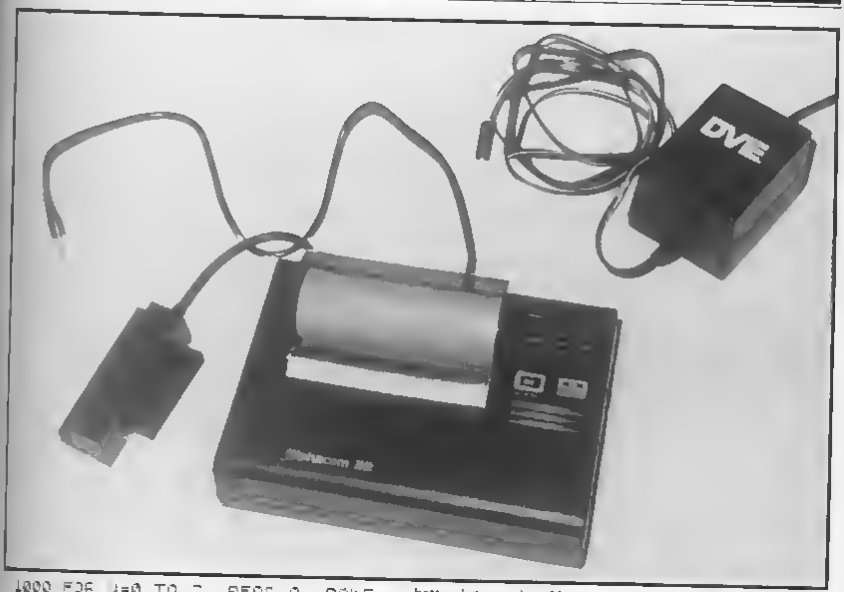
For non technical buffs, this means that the print is slightly thinner and slightly taller!

The print is easy to read with the naked eye, looks very professional and the paper is easy to handle. It does not tend to take a copy of your fingerprints every time you touch it! The paper is also much cheaper than the ZX printer paper, at £1.00 per 25 metre roll.

The main disadvantage of the machine is the great number of extra leads involved by using a separate PSU. If your system is permanently set up then they can be tucked away neatly and forgotten, but if you are using a mobile system then they add significantly to the spaghetti tiness of the situation.

Having produced twenty or so printouts on this machine I sent them to our reproduct[ion] department for them to congratulate me on discovering






```
1000 FOR N=0 TO 7   READ A   POKE
USR   A +N,A   NEXT N   DATA 0,24,2
4,255,189,60 35 202
1001 FOR N=0 TO 7   READ A   POKE
USR   B +N,A   NEXT N   DATA 0,56 5
6 48 60 48 104 76
1002 FOR N=0 TO 7   READ A   POKE
USR   C +N,A   NEXT N   DATA 0,28 2
8,12 50 12 22 50
1003 FOR N=0 TO 7   READ A   POKE
USR   D +N,A   NEXT N   DATA 255 12
9 129 129 129 129 255 255
1010 FOR N=0 TO 7   READ A   POKE
USR   B +N,A   NEXT N   DATA 195 66
 126 90 126 126,36 66
1020 FOR N=0 TO 7   READ A   POKE
USR   C +N,A   NEXT N   DATA 255 24
 24 24 24 24 24 255
1030 FOR N=0 TO 7   READ A   POKE
USR   D +N,A   NEXT N   DATA 195 19
9 195 255 255 195 195 195
1031 FOR N=0 TO 7   READ A   POKE
USR   G +N,A   NEXT N   DATA 12 18
40 68 66,1,0 0
1032 FOR N=0 TO 7   READ A   POKE
USR   H +N,A   NEXT N   DATA 0,0 1
66 65 40 12 12
1033 FOR N=0 TO 7   READ A   POKE
USR   I +N,A   NEXT N   DATA 96 3 2
0,34 68,129 0 0
1034 FOR N=0 TO 7   READ A   POKE
USR   J +N,A   NEXT N   DATA 0,0 12
3,66 34 20 8 96
1035 FOR N=0 TO 7   READ A   POKE
USR   K +N,A   NEXT N   DATA 0 129
129 129 129 243,255,255
```

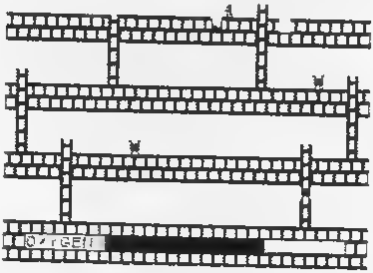
Fig 1

better listing print. My smug self satisfaction was quickly destroyed as the print would not copy well enough to use in magazine! The project therefore is still on.

However if you are looking for a very good alternative to the ZX printer I can wholeheartedly recommend this machine. At the new reduced price it represents very good value for money.

Fig 1 shows a few lines from this printer as an example of its output. Please remember that the reproduction is not very successful and the quality is actually better than is shown.

Finally Dean Electronics can be contacted at Glendale Park, Fernbank Road, Ascot, Berkshire SL5 8JB. Meanwhile they have kindly donated an Alphacom 32 as this month's super competition prize.



A sample screen display on the Alphacom 32

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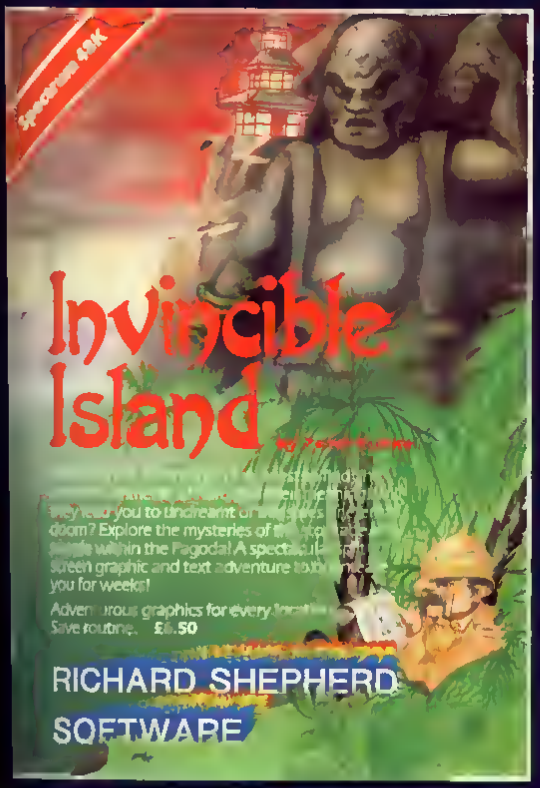
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Tunnel run



Scramble through the space maze in this program from David Link of Liverpool.

Lavishly based on one of the more popular arcade games, Tunnel Run has you exploring a space warp in your ship. There are four stages to the game, in which you must pilot through the regular tunnel, the asteroid belt, the spinning tunnel and finally you have to land your craft on the landing pad.

The program works mainly through the Last Plot P routine in Toolkit. However, you will still need 23692 POKEd into 23659 if you are to avoid scrolling the screen. If you do not do this the program will crash.

The terror of the tunnel

The movement keys used throughout the program are the

"I" key to move left and the "O" key to move right. In the second stage of the game, you use the "A" key to "land at the landing pad" and the "Q" key to "take off". Pressing the "P" key will pause the game. Pressing another key will continue play.

At the end of each of the game...

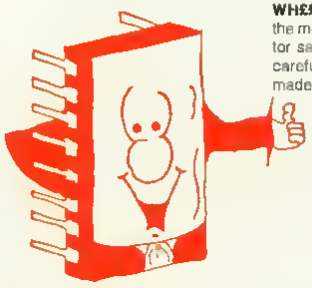
You have been chall...
explore this exciti...
and return home ALIV...
There are 4 section...
1> Missile tunnel.K...
2> Asteroids.Keys 5...
-20 points each...
per hit."
3> Winding tunnel.K...
Avoid space cr...
4> Landing pad.Keys ...
retro-boost.La...
yellow part."

```
  1 FOR f=0 TO 7
  2 READ a: POKE USR "L"+f,a
  3 NEXT f
  4 DATA BIN 00000000,BIN 01000
010,BIN 10011001,BIN 10111101,BI
N 11111111,BIN 10011001,BIN 0100
0010,BIN 00000000
 10 FOR f=0 TO 7
 20 READ a: POKE USR "P"+f,a
 30 NEXT f
 40 DATA BIN 01111110,BIN 00111
100,BIN 00011000,BIN 01111110,BI
N 01111110,BIN 01111110,BIN 0101
1010,BIN 00011000
 41 LET high=0
 42 PRINT "                EXPEDITION
 45 PRINT "Any key to start "
 46 IF INKEY$="" THEN GO TO 46
 50 LET a=15: LET sc=0
```

```
 70 BORDER 1  PAPER 1  INK 0  C
LS
 80 PRINT AT 21,0,"
                    "
 90 FOR f=1 TO 200
 95 IF a<=9 OR a>=17 THEN GO TO
900
100 PRINT AT 0,a;"P"
110 POKE 23692,255
112 LET a=a+(INKEY$="6")-(INKEY
$="5")
117 PRINT AT 21,0,
120 PRINT AT 21;INT (RND*7)+10;
INK 6;"+"
130 PRINT INK 4,"
                    "
140 LET b=ATTR (0,a)
150 IF b<>0 AND b<>12 THEN GO T
O 900
155 LET sc=sc+1
157 BEEP .005,0. BEEP .005,-2
158 NEXT f
170 FOR f=1 TO 22
180 PRINT AT 0,a;"p"
190 LET a=a+(INKEY$="6")-(INKEY
$="5")
195 POKE 23692,255
200 PRINT AT 21,0;"
                    "
210 PRINT "
                    "
220 LET b=ATTR (0,a)
230 IF b<>0 AND b<>12 THEN GO T
O 900
240 LET sc=sc+1
250 BEEP .01,0. BEEP .01,-2
260 NEXT f
270 PRINT AT 0,a;"P"
280 PRINT AT 10,10, FLASH 1;"Sc
ore ";sc
290 FOR f=1 TO 5
300 FOR n=10 TO 20
310 BEEP .1,n
320 NEXT n
330 NEXT f
340 PAUSE 250
342 BORDER 2. PAPER 2. CLS
343 PRINT AT 0,a,"P"
345 FOR f=1 TO 3
350 BEEP .2,-2: BEEP .3,-2; BEE
P .5,3.2
360 NEXT f
370 BEEP 1,3.2
375 LET c=20
380 FOR f=1 TO 200
390 PRINT AT 0,a,"P"
400 LET a=a+(INKEY$= "6")-(INKEY
$="5")
410 IF INKEY$<>"0" THEN GO TO 4
00
415 LET sc=sc-20
420 FOR n=1 TO 21
430 PRINT AT n,a, INK 6; "|"
435 NEXT n
440 IF a<>c THEN GO TO 470
450 LET sc=sc+100
460 FOR x=1 TO 30  PRINT AT 21,
x; INK 6, PAPER 0, FLASH 1;"8"
NEXT x
465 LET c=20
470 FOR n=1 TO 21  PRINT AT n,a
;" "  NEXT n
480 POKE 23692,255
481 PRINT AT 21,c," "
485 PRINT AT 21,0, INK 3, BRIGH
T 1, "##",AT 21,31, INK 3, BRIGH
T 1, #
490 PRINT '
                    "
500 PRINT AT 21,INT (RND*30), INK 4
,"O"
520 LET b=ATTR (0,a)
530 IF b<>16 THEN GO TO 900
540 LET c=c+(RND>.5)-(RND<.5)
555 BEEP .005,0  BEEP .005,-2
557 PRINT AT 21,c, INK 1, L
560 NEXT f
570 FOR f=1 TO 22  PRINT AT 21,
0,"  "  NEXT f
575 BORDER 3  PAPER 3. CLS
580 PRINT AT 0,a,"P"
590 PRINT AT 10,10, FLASH 1,"Sc
ore ";sc
600 BEEP 1,9  BEEP 1,10.7  BEEP
1.9  PAUSE 130  BEEP 2,0
605 LET tu=13
607 PRINT AT 10,10,"
                    "
610 FOR f=1 TO 172
620 PRINT AT 0,a,"p"
630 LET a=a+(INKEY$="6")-(INKEY
$="5")
640 POKE 23692,255
650 LET tu=tu+(RND>.5)-(RND<.5)
660 LET tu=tu+(tu<1)-(tu>24)
670 PRINT AT 21,tu, PAPER 3; IN
K 8;"
675 IF RND>.7 THEN PRINT AT 21,
(RND*5)+tu, INK 1,"L"
680 PRINT INK 7, BRIGHT 1,"
                    "
685 IF f>140 THEN PRINT AT 21,0
, PAPER 3, INK 0;"
                    "
690 LET b=ATTR (0,a)
700 IF b<>24 THEN GO TO 900
705 LET sc=sc+1
710 BEEP .005,0. BEEP .005,-2
720 NEXT f
730 BORDER 0  PAPER 0  INK 7:  C
LS
732 PRINT AT 0,a,"P"
734 LET g=INT (RND*30)+1
735 PRINT AT 15,0; INK 1,"######
0##############################"
736 FOR f=15 TO 21  PRINT AT f,
0,"
                    "  NEXT f
737 PRINT AT 15,g, INK 6,"0"
738 LET x=0
739 PAUSE 150
740 PRINT AT x,a,"P"
750 LET a=a+(INKEY$="6")-(INKEY
$="5")
755 LET a=a+(a<0)-(a>31)
760 LET x=x+1
765 PAUSE 5
770 IF INKEY$="0" THEN LET x=x-
1
780 IF x>=15 THEN GO TO 800
785 BEEP .005,0  BEEP .005,-2
790 PRINT AT x,a," "  GO TO 740
800 IF a<>g THEN GO TO 900
810 PAPER 0  INK 7  FLASH 1  CL
S
820 PRINT AT x,15,"P"
830 PRINT AT 17,10,"SCORE ",sc
832 IF sc>high THEN LET high=sc
833 PRINT AT 18,10,"HIGH ",high
835 CIRCLE 125,85,80
840 FOR f=1 TO 20  BEEP .01,f.
NEXT f
850 GO TO 920
900 CLS  PRINT AT 10,0;"You ha
ve crashed.Score:";sc;"."
915 FOR f=0 TO -10 STEP -1  BEE
P .01,f  NEXT f
920 PRINT  PRINT "PRESS Y FOR
ANOTHER GO,N TO STOP"
930 IF INKEY$="" THEN GO TO 930
935 FLASH 0  CLS
940 IF INKEY$="y" THEN GO TO 45
```

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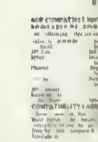
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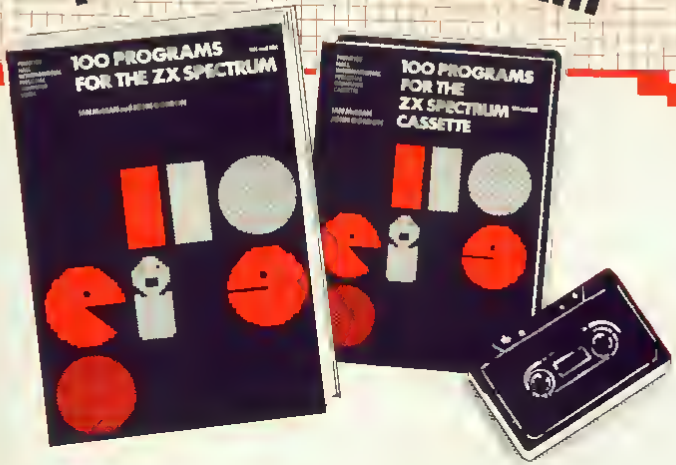
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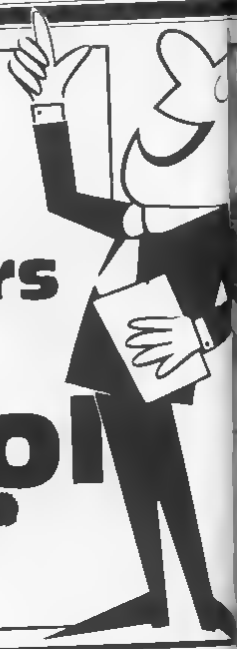
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Computers in school



Are they just another educational toy asks John Bourne, Resource Centre Co-ordinator at Elphinstone School in Hastings.

Now that the Government scheme is underway to place a computer in every primary school we should be asking ourselves if we need it and what we will do with it.

Those of us who have been pioneers in computer work in the primary school are aware of the many snags that await the unwary and we can hopefully give advice to the newcomer.

First of all it will soon become apparent that in any primary school of average size one computer will not be enough. Indeed it would be true to say that most schools would need at least five to ensure a profitable approach from this new educational tool. With this in mind we must carefully consider which micro we opt for in the first place.

In our school we went for the ZX81 against the advice of many of the experts but with encouragement from those who really knew what would best suit newcomers to the subject. The ZX81 is not included in the government scheme - more's the pity but of the three that are included I would certainly opt for the Spectrum for the following reasons:

1. It is inexpensive when compared with the others.
2. It is fairly easy to operate and understand at the level needed.
3. It will cope with anything that a primary school is ever likely to need and indeed many of its functions will never be used.
4. Although it is a colour computer it doesn't have to operate on a colour monitor (or TV).

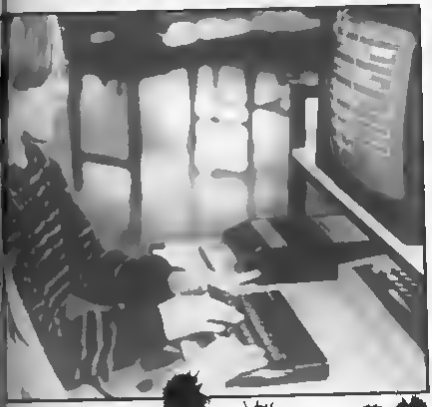
Now many of the experts will tell you to go for one of the other models but think carefully. If you wish to increase the number of computers then could you possibly afford to do so when the full price is chargeable to your capitation or school fund? And remember many of the experts are COMPUTER EXPERTS not necessarily those whose really know the needs of primary children. Indeed by the very nature of their activities they would probably find it difficult to understand the requirements of young children setting out on the adventure of computer studies.

Also it is correct to say that when you obtain your computer it will be rapidly superceded by a newer model (a fact that matters little to the primary school) and no matter what you pay at the end of 12 months you are on your own when something goes wrong — and it probably will. You are left to pick up the repair bill and the more expensive the original the greater will be the charge.

So you've received the bright new addition to the school hardware. What on earth are you going to do with it? There are four main options open to you:

1. Individual or group tuition using software that teaches — an impressive teaching machine.
2. As a classroom animated blackboard. Pie charts, bar graphs etc.
3. An addition to the office hardware. Pop in all the school records.
4. As a tool of the present and future that children learn to use and understand.





I don t think the Ministry would rate option 3 as what they had in mind for the scheme and there could of course be a fifth option – a dust covered object in some corner of a cupboard

On the whole if one studies the educational grass oi looks n the computer magazines you ould be forgiven if you hought that the computer of here only options 1 and 2 to the rimary school teacher The whole emphasis is on SOFT WARE Cres are going out rom educational publishers I ece ved two this week for teachers (or indeed anyone) to oroduce software for the junior market It will then no doubt e well packaged wall pre sented accurately recorded and expensively priced

I do not blame the publishers for this for that is what their business is all about They know full well that the vast majority of teachers who use the new fangled gadget will need the constant back up of these resources to convince everyone including themselves that computers are the nothing and everyone should have one

I believe that option 4 should be the number one priority Only then will the machine serve a really useful purpose and justify the capital outlay At Elphinstone we have the largest Resource Centre in a Junior school in South East England and we made a positive decision to move into computer education some time ago We opted for the ZX81 because it enables us to install five machines with SAVE/LOAD facilities plus one print out and individual TV monitors for a cost of just over £600

Four of the machines are permanently installed in the Centre and these are available for use by any member of staff or children at any time and they are constantly in use We have overcome all the problems of LOAD/SAVE crashing etc by the way in which the machines were installed We have also made a number of software programs have purchased a few which we thought might be useful and have taped many from computer magazines Our software library is not the main priority and is used on a fairly irregular basis It is used only when it is USEFUL

As our top priority would be the need to familiarise all children with the capabilities of the machine (within their understanding range) we decided to produce a learning programme that would enable them at the end of their junior school course to write and operate fairly useful computer programs taking that ages into consideration

We ran an inservice course within the school for our teaching staff to introduce them to computers and to show the many varied ways they could be used but with the emphasis on teaching children and the staff to program

Our first and second year children receive introductory talks and example lessons throughout the year to arouse their curiosity and we have prepared two text books of lessons for the third and fourth year children Each year text book consists of ten lessons which take about an hour (it could be two half hour sessions) and they are followed by individual work requirements At the back of each booklet is a pocket containing a mock up keyboard At the completion of each course work sheets are available so that children can practice their skills and improve their techniques In this way every child in the school is given the opportunity to understand the technology of the future

In all fairness one has to say that the preparation of such material takes time and effort It needs a member of staff who understands the needs and abilities of the primary school child is aware of the aims of the school has a working knowledge of the computer in use but does not have to be a computer expert

nice new educational toy or a teaching machine in many schools It will gobble up large quantities of software much of which will be unsuitable or it may finish up as a convenient tool in the school library acting as an electronic catalogue In a number of cases teachers with sufficient time will find they cannot understand the wretched thing and it will creep into the corner of some dusty storeroom or stock cupboard Those who have tried it and declared it wanting will label it as another new gimmick that is educationally unsound This happened initially with TV video visual aids apparatus and calculators but the wretched things refused to go away



I fear that the main problem will be that, in spite of advertising and what they are told by educational publishers and computer manufacturers the teachers will find that it is NOT EASY to understand computer language unless you are prepared to make a considerable effort

It is for this reason that I fear for the future of the computer in primary education It may become nothing more than a

Think well before you choose plan well before you use don t be too ambitious and realise from the very beginning that todays children are electronic button pushers and they won t let you get away with writing off the computer Good luck to you You will with the correct approach discover that computers in the primary school are really valid educational machines and as an added bonus THEY ARE FUN

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competition



COMPETITION

At *ZX Computing* we always try and make our competitions a bit off the beaten track so here's a few simple questions for all you film and television fanatics!

Many films for both the large and small screens have featured computers — this month we're asking you to tell us the names of four well known electronic characters who have become stars in their own right. Easy isn't it!

All you have to do is study the given clues and when you think you have found the answers fill in the coupon and send it to us complete with your name and address. Finally please could you also write your answers on the back of your sealed envelope.

The prizes

There is only going to be one prizewinner this month but what a prize! The owner of the first correct entry drawn from our all prpose dustbin will receive a superb Alphacom 32 printer kindly donated to us by Dean Electronics. You only have to read my review in this issue to find out just how impressed I am with this machine. If only I could enter the competition myself.

1 Stanley Kubrick's spaceship computer blew a few chips in the year 2001

2 The fitting of this computer to David Knight's car means Pontiacs will never be the same again

3 This big computer was involved by Joshua in a very dangerous war game

4 Who is the latest ship bound servant on Blake's Seven?

Name

Address

Postcode

The rules

- This competition is open to all UK and Northern Ireland readers of ZX Computing except employees of Argus Specialist Publications Ltd their printers and distributors and employees of Dean Electronics. This restriction also applies to employee's families and agents of the companies or anyone else associated with the competition.
- As long as the correct coupon is used for each entry there is no limit to the number of entries from each individual.
- All entries must be postmarked before March 31 1984. The first prize will be awarded to the first correct entry picked at random.
- The winner will be picked by the Editor of *ZX Computing*. No correspondence will be entered into with regard to the results and it is a condition of entry that the Editor's decision is accepted as final.
- The winner will be notified by post and the results of the competition will be published in a future issue of *ZX Computing*.

Address your entries to:

ZX Computing — Electronic Stars Competition
1 Golden Square,
London W1R 3AB

competition



Results

Well, all you keen-eyed readers, thank you for all the entries to the Spot the Difference competition in the Oct/Nov issue of *ZX Computing*. We had great difficulty finding a hat big enough to put all the entries in, but the Editor came up trumps again!

The ten first prize winners were

P V G Atkins of Argyll
James Seabrook of Sevenoaks
Tony Louzado of London N16
J M Clements of Sidcup
R T Tacey of Manchester
Ian Heath of Wirral
Richard Eagles of Bromley
A Carswell of Paisley
David Fensom of Lutterworth
Lee Wright of Bexley

The ten runners-up were

A Bailey of New Malden
R Meckinlay of Poole
Mark Webber of Long Eaton
Roger Saunders of Norwich
E W Fairweather of Lincoln
D W Phillips of Hayling Island
A Porter of Plymouth
Robert Amey of Norfolk
Agavanakis Kyriakos of Athens
Steven Dowland of Peterborough

Congratulations to all the above who spotted the eleven differences in the two cartoons and commiserations to all those of you who entered but didn't get picked — you can't win them all.



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● With Sinclair's worldwide sales approaching 2 million and further product range expansion planned a huge new warehousing centre of 32 500 square feet has been opened for Sinclair Research at Frimley Surrey by its sole UK distributor, GSI (UK) Limited

As a result GSI now employs up to 145 staff at any one time on Sinclair work an increase of 130% over the last year This new £220 000 warehouse more than quadruples GSI's existing capacity to provide retail distribution, mail order and computer services for Sinclair Storage capacity has risen from 26 to 2000 units and there are now eight packaging production lines against two previously Just working on a basic one-shift day GSI can now handle up to 250 000 hardware products, 300 000 phone calls and 100,000 phone calls in just one month (that's almost as good as the ZX office!)

Sinclair's managing director Nigel Searle thinks that there are good prospects for further growth in 1984 and states that "larger premises are vital for both expansion and streamlining they give us faster stock turnaround cut unit distribution costs and enable us to further enhance the quality control function at GSI" which is good news for Sinclair and for the consumers



● The respective companies of Sir Clive Sinclair and the Rt Hon Harold Macmillan have got together to produce a new range of educational software for children aged between five and twelve There are nine programs in all five in the 'Learn to Read' series based on Macmillan's popular 'Gay Way' series and four 'Science Horizons' programs that explain key scientific ideas using graphic displays

Ex prime minister Mr Macmillan said that "since the business was founded in Cambridge in the 1840 s it has been our primary concern to ensure that the finest educational and instructional books and material are available to the young people of this country and I am pleased that in my 90th year my family business continues this worthy tradition by joining Sir Clive Sinclair in this technological advance"

Sir Clive replied by saying that we're proud of our association with Macmillan Education and the software which has resulted from it The programs combine fun and work to attract and hold the children's attention — while at the same time explaining complex ideas"

The Learn to Read series takes an early reader aged five to seven from letter recognition to positional language — actively demonstrating words and phrases like 'in front of' or 'inside' Reading and the alphabet are taught by friendly animal characters and a reward system gives children the chance to see their achievements grow

Science Horizons also makes good use of the computer medium by teaching science concepts to eight to twelve year olds through real life simulations In Glider for example, the pilot must take into account the time of day cloud cover and terrain below as he tries to keep the glider airborne for as long as possible Survival models the natural world of hazards that wild animals face in their struggle to stay alive while Magnets explains the idea of the magnetic forces of attraction and repulsion in an exciting board game Finally Cargo simulates the problems facing a cargo ship captain as he plans his itinery Plimsoll line principles are learned as the child balances the load to avoid capsizing or sinking

All these programs are prices at £9 95 and are available from Sinclair Research

● Micro PROLOG a version of the advanced logic programming language PROLOG which was developed for Sinclair Research by Logic Programming Associates is now available for the ZX Spectrum

The first PROLOG adaptation for micros, micro-PROLOG uses simple 'English' phrases as the basis for a dialogue between computer and user and as such is extremely flexible and offers great potential for educational uses It is available in cassette form with user manual and a copy of the micro PROLOG Primer at £24 95 A separate reference manual for advanced micro PROLOG users is in preparation manager "They incorporate moving graphics with changing characters which hold a child's attention and make learning fun"

● Blackboard Software has also developed six new educational programs for Sinclair Research Designed to teach spelling and punctuation these programs are very different from most educational software says Alison Maguire Sinclair's software development

Among the programs are Early Punctuation Speech Marks and The Apostrophe in which animated men and animals drop the correct punctuation into place at the user's suggestion and you can make apples grow on trees by correctly identifying words for capitalisation in Capital Letters!

Castle Spellerous is a spelling game with ten levels of vocabulary By answering the questions correctly the child can use his band of soldiers to try and rescue the beautiful princess who is imprisoned in the castle Finally Alphabet includes three games of letter recognition to help children learn the alphabet while at the same time familiarising themselves with the computer keyboard

All the Blackboard Software for the 48K Spectrum is designed for use both in the classroom and at home for children aged between five and twelve and is priced at £7 95 per program

● One of the newest Spectrum programs bearing the Sinclair banner is "Chequered Flag", a fast paced companion to Flight Simulation The game simulates a heir raising drive around five of the worlds famous racing circuits or fire specially designed courses Developed for Sinclair by Psion it is priced at £6 95 ▶

There's been a wealth of new software released over the last few weeks! Here I'll try to give a brief summary of some of the latest we've received. These are not full reviews, but just an indication of the game, type and Editor's opinion on the few I've fed into my overworked machines.

● Dominoes for both Spectrum and ZX81 is available from Phipps Associates, 172 Kingston Rd, Ewell, Surrey. Along with the tapes in the review sections their Adventure tape 1 is an especially good buy at £5.00 and consists of three full adventure games previously sold at £4.95 each. However, their latest programs are two Spectrum arcade games Gorgon and Black Planet both of which look very interesting.

● Making an impact on the Spectrum market is VISIONS, 1 Felgate Mews, Studland Street, London, W6 9JT. To launch their Snooker program the top class player, Steve Davis makes an appearance! I tried Sheer Panic and Pitman Seven, two challenging arcade games well worth a look. We'll be featuring some of their games in full review form in later editions.

● A & F have become a name associated with quality software, and they continue to produce the goods. One Hundred and Eighty is an interesting two player darts game simulation.

● Probably the most striking name to appear recently is Joe the Lion software. There is only one Spectrum game in their introductory range of three, called Bimbo. It appears to be an arcade game and we look forward to being able to review it properly.

● Micromega have announced that they will be exclusive suppliers to Wigfalls stores, producers of the acclaimed Luna Crabs and Haunted Hedges. Micromega also supply programs for serious applications in personal financial management and in education in collaboration with the Longman Group. I have just tried their latest arcade games, Starclash and 3D Deathchase and I recommend that you try them as soon as you can!

● Melbourne House, famous (or infamous as some frustrated players claim) for The Hobbit, has taken over all rights to Abersoft's Forth program. The program will be redocumented before its re-emergence, and Melbourne House wax lyrical over its capabilities. They certainly seem to have an eye for class Spectrum programs, and at £14.95 this could be the leader of the genre.

● The first company to produce software to be used in conjunction with the Microdrive (as far as I know) is Richard Shepherd Software. With a Cash Controller program for the 48K Spectrum at £9.95, up to 400 transactions can be handled under 16 headings.

Invincible Island is another of their releases and is a traditional adventure with scenic graphics provided. I ran it but didn't get very far and, if I'd continued, this issue would still be unedited.

● Mikrogen have released "Mad Martha II" (are sequels going to become as familiar as in the cinema?) and have also improved their Masterchess program. Even though Masterchess received some criticism, it has been a constant chart entry and it is to Mikrogen's credit that they have made the effort to listen to the critics and adjust and adapt their program. ZX81 owners are also catered for by this company with the best seller ZX Chess.

● 5D Software have a very reasonable range of ZX81 software on the market at prices from £2.00 to £4.50. Two Spectrum programs are also available. Write to 5D Software, Hempland Cottage, The Green, N. Lopham, Diss, Norfolk. If they send us some review copies we'll tell you more.

● Saggitarian Software of 3 Wythburn Close, Loughborough, Leics. have produced some new programs — one, called Gamespack 1, is a nice selection of games that would increase the variety of programs in your collection for £4.95. Games include Fruit Machine, Pontoon, Othello, Mastymind and Calendar.

● Look out for Tutankhamun from Micromania, an exciting arcade game for £5.95. This is a graphic action maze game with slight adventure overtones for the Spectrum. Currently the most popular game in the Editor's household.

● Automata continue to puzzle and amuse with Groucho (I abbreviated the title). A quick peek told me that I had to leave it alone as I sent it for a proper review. After all, you don't want an insane Editor do you? Mono meets the Bikers is their venture into the Spectrum arcade media and a very good venture it is too.

● For those who like to use the computer to stimulate their minds, CCS Ltd continue to produce strategy and simulation games for both Spectrum and ZX81. Abyss is described as a Krypton factor adventure game, while Gangsters, Brewery and Polaris follow the simulation style. None of their latest programs are for the 81.

● Commodore specialists Terminal software move into the Spectrum market with two "exciting real time graphic adventures" called Space Island (reviewed in this issue) and Vampire Village. At £6.95 each they are available from 28 Church Lane, Prestwich, Manchester.

● An interesting tape arrives from Micro-Kraft which allows choice of 12 different character sets including Greek and Hebrew. It is called Typeset and priced at £5.60. Micro-Kraft is at 48 Seacourt, Clontarf, Dublin 3, Eire.



● Sector software intends to develop new ideas using both software and board games. Their first program Power House has a small but attractive map supplied with the tape. I have not yet tried it but it looks interesting. Sector say that it requires logic, forward planning and quick thinking! Power House is for the Spectrum only and is available at £4.99 from Sector Software, 41 Keats House, Porchester Mead, Beckenham, Kent.

● Felix software have two adventure games which look interesting. For both ZX81 and Spectrum, Castle Colditz and Tomb of Dracula are £5.95 and £4.95 respectively (with both prices £1.00 less for ZX81 versions). Felix are at 15 Laighton Avenue, Pinner, Middx.

● Hunter Killer looked good when it was published in a monthly magazine. Now released on cassette, it is the first game to utilise the interface I network facility and allow two independent players on separate Spectrums to play. This is an exciting advance and a great looking game. A single player version is also supplied for those of us who are still waiting/can't afford/not interested in the interface. Available at £7.95 from Protek at Unit 1A, Young Square, Brucefield Industrial Park, Livingston.

● Another interesting game is Usurper from Assassin Software (what bloodthirsty names!). This is a multi player fantasy adventure game the difference being that from 1 to 10 players (1 to 6 on 16K) can play. Two versions are on the tape, one for use with a map supplied and one for use with the Spectrum alone. Usurper will set you back £6.00 from Assassin Software, 10 Ash Road, Leeds LS6 3JF.

● Dk'Tronics is one of the most prolific producers of software with 13 new games for the Spectrum and one for the ZX81 (only ONE!). Too many to mention here, but keep your eye open for their adverts and most stockists sell their products.

● PSS are rapidly gaining a good reputation and the release of Krazy Kong and Hopper for the 48K Spectrum will no doubt add to their following. Both these games will be released throughout Europe and Australia so all our international readers will be able to purchase copies easily.

● Rock music may be hard to compose on the Spectrum but you can experience the trials and tribulations of seeking fame and fortune in the music business with Bigtime from a new company called Mushroomsoft. They can be contacted at 13 Harnorlen Road, Peverell, Plymouth. Mind you, you'll have to invest £4.50, but the company is making an attempt to keep their prices to a minimum.

● Supersoft Systems at 91 Manor Road, Higham Hill, London E17 5RY are selling four Spectrum games called 3D Strategy Supercode, Pawnchess and Superfile. We haven't received any review copies so I cannot say more. (Hint, Hint)



● Three unusual but significant programs which show the varied and serious applications for which the Spectrum can be used definitely deserve a mention. Beamscan from the company of the same name is for architects designing steel beams. Brane Software's Cut Your Heating Bills helps you to decide how to effectively insulate your home, and Delta 7's Diet Master, one of three planned, will help you choose a healthy diet.

● ISP have produced SCOPE which they describe as a compiled multitask language designed for writing arcade style games and graphics". Owing to its ability which enables the user to create any routine he requires, it is far superior to the usual menu driven games makers' claims, managing director Alan Pendle. At £11.95 it is worth checking out.

● Bellflower's Music Maker which has received a wide range of review opinion is now available in the high street so you can see it for yourself and make your own judgement.

On a Serious Note...

● Kemp Ltd of 43 Muswell Hill, London, N10 3PN have a range of business software which is worth investigating if you want to use your spectrum for stock control.

A friend of mine uses their Stock Control in his school Stock Ledger and other programs are available for most small business applications.

Education section...

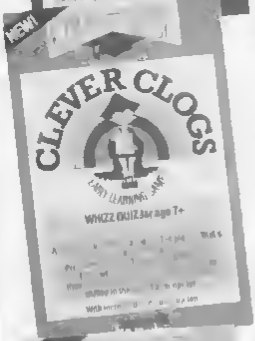
● Mirrorsoft have entered the software jungle and decided to go for educational programs, much to their credit. Three early learning programs are the first to appear for three different machines, although eventually, versions of each program are planned for each machine. Quick Thinking is the Spectrum program and was written by Widget Software who already sell an excellent range of educational tapes.

I personally wish both companies much luck and we'll feature a full review soon. Meanwhile I'm considering having a special software review section for educational programs as so many are being released.

● Poppy Programs have added Hidden Letters to their range. I have used this program and examined the BASIC listing and can report ▶

that although it could have been improved it is nevertheless a good program to have and is well error trapped The price of £6 00 includes a keyboard overlay





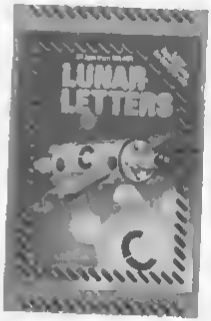


● Arnold Wheaton in conjunction with Artic Computing Ltd must be a force to deal with They have produced a range of educational programs aimed at the older child (from eight to thirteen years) All appear to be of a high standard and we await review copies with anticipation

● Chalksoft have increased the number of their products and have released an updated catalogue which may be obtained from 37 Willowslea Road Worcester WR3 7QF The latest game is called Pirate and is described as an educational adventure It costs £9 95 and is for the 48K Spectrum

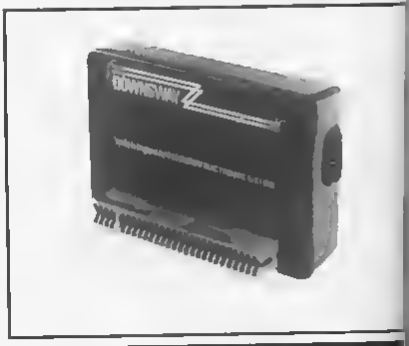
● Four programs on one cassette from Turtle Software for £5 95 aimed at the six to eleven age range can be obtained from Wychwood School Road, Finstock Oxford

● Clever Cloggs sent us three nice looking cassette inserts for programs for toddlers aged three upwards All are priced at £6 50 and more are promised Obtainable from Computertutor P O Box 3 St Neots Huntingdon Cambs



● Longman Software have increased their range for the Spectrum with Lunar Letters Robot Runner, Sum Scruncher and Wild Words All four are priced at £7 95 each and are supplied with comprehensive instructions

● Finally Griffin enter the arena with six programs for children aged four to nine However they intend to increase their range to include the much more difficult area of programs for CSE and 'O' level students The first programs for the 48K Spectrum cost £7 99 each We will watch for their next issue with interest



● Joystick interfaces move into another generation with the advent of fully programmable models Downsway Electronics produce such a model which plugs into the back of the Spectrum All you do to program it is to press the appropriate key and move the stick in the relative direction — eight directions plus fire can be programmed in this way The cost of this latest electronic breakthrough is £22 95 and it will work with any of the switch type joysticks like Atari, Quickshot, Competition Pro etc Downsway Electronics are at Depot Road, Epsom Surrey

● The Currah Microspeech unit has been adopted by many of the top software houses Bugbyte Artic and Ultimate to name but a few The machine uses the allophone system to produce speech and costs £29 95 from Currah Computer Components Ltd Graythorpe Industrial Estate Hartlepool Cleveland





• Want to connect your Spectrum or ZX81 to a monitor instead of the TV for better clarity? With the emergence of a colour monitor for £159 95 it is as cheap if not cheaper, than buying a colour portable Adapt Electronics have marketed a kit which needs no soldering or special skill to fit, complete with step by step instructions Costly? Just an amazing £2 75 plus 50p postage Adapt Electronics can be reached at 20 Sterling Close Buckhurst Hill, Essex IG9 5TN

• The Spectrum Stick from Grant Design Ltd Bank House Reepham Norwich, Norfolk is an ingenious device which fits on top of the Spectrum and operates the 6 7 8 and 9 keys by a lever system eliminating an expensive electrical interface

I tried it out and found it to work well and although not as sturdy or responsive as many of its counterparts it is much better than using the cursor keys Of course if the game uses keys other than the cursor keys then the joystick doesn't work, also it won t fit onto a non standard keyboard

An interesting alternative if you don t want to spend a small fortune on the normal type of joystick the Spectrum Stick costs £9 95

• The Stack Light Rifle was a major attraction at the computer fairs I attended so much so that I couldn t get a go! Six programs so far supply a range of shoot 'em up games compatible with this rifle and there are more promised from major software houses

The Light Rifle is available for £29 95 (including three games) from Stack Computer Services Ltd , 290 298 Derby Road, Bootle Liverpool L20 8LN

• If you are interested in modifying and adapting your ZX81 or Spectrum to performing unusual tasks then contact Eprom Services of 3 Wedgewood Drive Leeds LS8 1EF They supply all sorts of electronic goodies mostly in Eprom form

• A special keyboard suitable for teaching very young children is available from Star Microterminals, 22 Hyde Street Winchester, Hants Each program can use a separate overlay on the large flat surface which has an 8×16 touch sensitive matrix The overlay can be written to correspond with the input that will be required during a program run It's much easier to press a key marked "YES" than to "Press 1 if correct"

• I found an interesting device at the bottom of my drawer called the Petron Trichord which comes with an accompanying tape to play on the stereo The sounds which issued forth were astounding! I investigated further and discovered that it like many of its contemporaries contains the AY 3 8910 programmable sound generator but unlike most other sound generators it also contains a PROM with data for sound effects and a music program of very sophisticated ability

One was duly supplied and I ll get a full review done on it for the next issue Meanwhile if you want to check it out contact Petron Electronics 1 Courtlands Road Newton Abbot South Devon, TO12 2JA It is priced between £24 95 and £29 95 depending on whether you want ZX81 Spectrum and built in amp versions

• The high priest of Forth in this country at the moment must be David Husband whose Spectrum and ZX81 Forth ROMS turn the ordinary little computers into very fast and efficient control machines Completely unique in design yet compatible with FIG forth these include such advanced features as user defined split screens and multi tasking

If you're wondering what to do with your old ZX81 and would like to try and automate your model railway or control your house then contact David at 2 Gorleston Road Branksome Poole BH12 1NW The ZX81 Forth ROM can be bought in kit form for £25 00 plus VAT

I have turned over the ZX81 sent to us by Davis to Peter Shaw (our hardware expert) and expect his opinion for the next issue

• Ness Micro Systems 100 Drakies Avenue Inverness, tell us that they have a low-cost relay board with four channels available for the Spectrum at £24 95 plus £1 50 p&p

Each channel has a double pole 5 amp relay rated at 1KW at 240V A/C (100W at 25V D/C) Unlike other relay boards it plugs into the Mic socket and is powered from the Spectrum s supply The relays are activated by the BEEP command, either from a program or from the keyboard and may be daisy chained for more operators ▶



● McGraw-Hill has brought out a series of personal computer books and soft ware for the hobbyist programmer small business user and for the educational market

Linda Hurley s book "ZX81/TS1000 Programming for Young Programmers" and its companion cassette is the first in the series The book is intended to teach children from nine years of age how to program in BASIC. It uses games and movement and a clever set of colour coded listings which match the ZX81 s keyboard The book costs £4 95 and the tape is £5 95

For home and business use there is PROFILE 1 by Col n Street which runs on the 48K Spectrum This is a spreadsheet type program which handles both numbers and text Each column can be user specifed — width and number type — and each row contains a complete record The program includes "ssarch and replace', "find". "process" and "alphan-umenc sort" functions with provision to print out mixed text and records to the ZX printer or to several of the larger printers via a suitable interface This is priced at £9 95

A full function Z80 Assembler for Spectrum machine code programmers is the third and final item at the moment to be released from this company and costs £7 95

I have tried Profile 1 and the Assembler and can report that they are well documented and impressive additions to the market

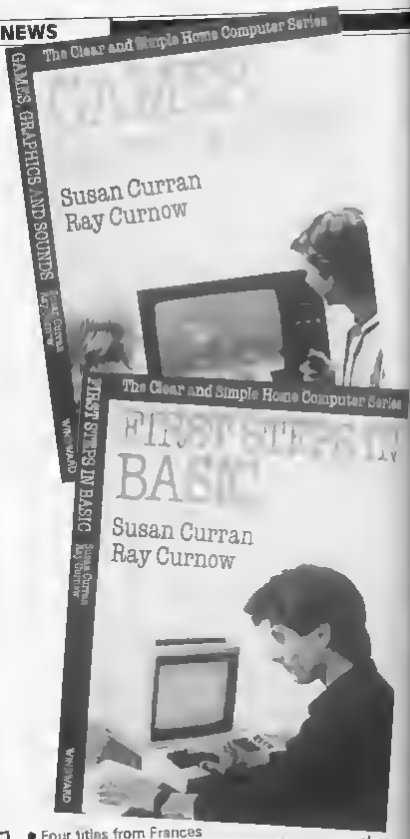
● Tim Hartnell continues to produce books which look very attractive Tim as regular readers will know, graces our pages with his wisdom and has been a welcome writer for us ever since he vacated the Editor's seat. His new book "Giant Book of Computer Games", is 390 pages long costs £7 95 and is compatible with most home computers I look forward to receiving a copy of this book from Interface publications for review

● The Computer Bookshop of 30 Lincoln Road Olton Birmingham has obtained sole distribution rights for the American SYBEX publications These books cover a wide range of subjects from BASIC to machine code and all look very eye catching — I envy our book reviewer Patrick Cain

● A wide range of topics are covered by publishers Butterworths and Nawnes A hundred computer related titles are available and a new colour catalogue is obtainable on request from Butterworths & Co (Publishers) Ltd Borough Green, Sevenoaks, Kent. We received two on programming languages FORTRAN and PASCAL and I was loathe to hand them over for review

● LOGIC 3 has produced what must be one of the best instructional packages on the market. Called "Learn BASIC programming on the SINCLAIR ZX Spectrum" it consists of a ring bound manual, two tapes with 20 programs, and a flowchart stencil The manual presumes no experiance whatever and progresses in a step by step manner At £12 95 this is the perfect present for the child (or adult!) who has become bored with playing games on his Christmas gift and wants to know more

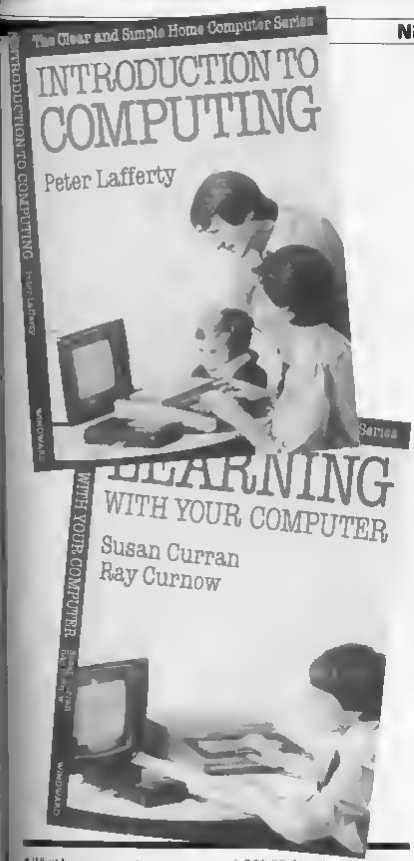




● Four titles from Frances Lincoln Publishers Ltd and Windward under the heading "The Clear and Simple Home Computer Series" found their way to us and we hope to give you a fuller report in a future issue A cursory (pun intended) glance revealed an attractive set of books which cover games learning, first steps and an introduction to BASIC All four are priced at £4.95 each and are multi machine based

● "The Microcomputer User s Handbook" from Macmillan Press is a 400 page reference book or guide to computers It contains masses of information on computers and accessories — a must for the technological lan at £16 95

● Talking of the technical side, the "Maplin Buyer s Guide to Electronic Components and Home Computers" (don t they all have long titles nowadays) contains 500 pages of kits (don t forget the ZX81 was once sold in kit form!) and electronic gizmos computers and robots At £1 35 it s worth getting just to browse through and knows, one of those items might prove irresistible



● What have computers, photography and gourmet food in common? Well, Anchor Hotels are running a series of "Tailor Made special Breakaway" weekends at their hotels throughout the country during the period January to June 1984. The weekends include two nights accommodation with breakfast and dinner and, of course, an entertaining and practical programme on each subject.

The cost is very reasonable — £59.00 per person for the computing and photography course and £62.00 for the gourmet weekend. A detailed brochure can be obtained by ringing 0252 517157.

● Webster Software, the recently formed distribution service, were overjoyed to receive the prize contract to supply 277 Boots branches with the best software titles for all major home computers. This followed a trial period when they supplied twenty branches successfully.

● Another step into the future can be seen in the opening of Adam's World in Station Road, Edgware, a shop dedicated to stocking computer ware of all sorts, books, magazines and, of course, programs. Demonstration facilities are provided and Mr Derek Tidman states, "presenting and stocking what the customer wants and not what the buyer selects" is their aim. Maybe the ZX81 will get the support it deserves here!

● Software Centre Ltd, of 426 Cranbrook Road, Gants Hill, Ilford, is another retail outlet for software, but the customer has a full month in which to decide whether he is satisfied with his game — if not he can exchange it for another at 80% of its original cost. Many of the leading software houses are suppressing their natural fears of copying abuse and giving the system a try.

● A & F are taking an interesting direction with their programs. Using a feature called Ramwise, they say that now their new programs will fit into computers regardless of memory size. The programs will run but the greater the memory the greater the number of features the program will support. This means that as a computer is upgraded the user gets more from the same program.

● W H. Smith has produced their own video program called "Introduction to Programming" in an attempt to educate us. Priced at £16.95 there are two levels, beginners and advanced and feature programs in BASIC to be transferred to the user's computer.

● Talking of Smiths, they recently tried and failed to introduce computers into their branch at sleepy Minehead, so a contact of mine tells me. After a few months of displaying a ZX81 usually in "off" mode, they were removed as being a bad sales line. A small local shop "Minehead Radio" decided to do it properly and invested in a wide range of machines and peripherals and are now one of the most popular places in town (and making a functional success of it) good old Jack the Giant Killer stuff!

● General Accident insurance call to our attention that you should check on your insurance cover in respect of your computer. If you find that you need cover, they'll be only too pleased to speak to you.

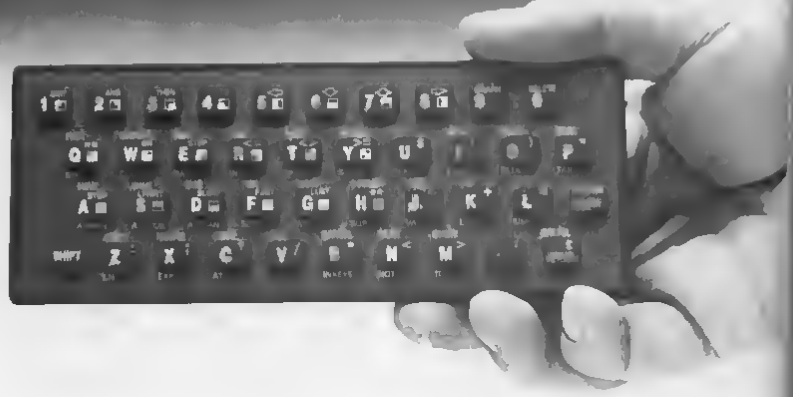
● Prism Micro Products Ltd are to be responsible for software marketed by Greens in the Debenhams stores. Over 200 titles are mentioned for each store including ZX81 programs. Also three stores have been selected for "Superstore" treatment, but they are not saying which just yet.

● I was lucky enough to get to the Bristol Home Tech exhibition, but unfortunately most of the established producers didn't. Nevertheless, it was quite enjoyable as many clubs were in attendance as were several of the local shops. Bransal Computers attracted a big crowd and offered bargains in the traditional way, John Holmes showed a nice line of musical instruments and other exhibitors were full of cheer.

All the visitors I saw and met were happy, and I would like to mention "Computer Add Ons", one of the few national companies to attend, who were doing great things for customer relations at all the events I attended.

● The Northern Computer Fair was, as expected, a huge success and most of the well known names were there. Many companies launched new tapes and add-ons, and I was able to meet for the first time many of the people who had been, until then, only names on slips of paper. By the time this edition reaches you all this will be ancient history so I'll content myself by saying: "Great man, just great!"

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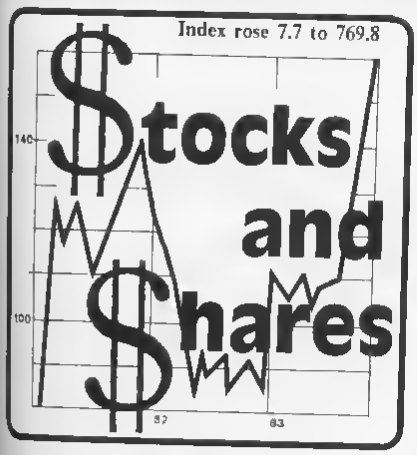
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D Bayliss helps you to take stock of the situation with this ZX 81 game.



Written for the ZX81, this game will run on a Spectrum with only a few modifications and had the advantage that up to 10 players may take part — call in the neighbours after typing it in!

When you finally finish and RUN it you will be asked to enter the number of players once this is entered all the players must decide between themselves how many rounds to play. A round is completed once all players have had a turn. The game now starts.

Initially the shares table is set up this occupies the top half of the screen the lower half being used to display information for the players.

Five columns are shown in the shares table these are

1 Share title
2 Number available
3 Unit cost per share
4 Number of shares the player owns
5 Number of shares reserved by the player

On the left of the screen at the top the number of players is shown the top right number is the number of the player whose turn it is. The number at the bottom left of the shares table shows which round you have reached out of the total to be played, and at the bottom right of the shares table the current player's cash is displayed.

At the start and end of every player's turn he must make a decision which will influence the market, a careful decision here could help to make a killing. Once the market influence has been made then you have a menu of options which include

This game is certain to appeal to the mercenary side of your nature and who knows one day the practise may prove valuable

BUY — If you press "1" then you will be asked which shares you wish to buy and how many
SELL — Pressing "2" will enable you to sell as many of whichever shares you wish to be rid of
SELL ALL — Key "3" will sell off all the shares that player owns
RESERVE — You may reserve shares (if none of the type you want are available) by pressing "4". As soon as a player sells any of that type then they are purchased for you automatically — strict order of priority is maintained. To cancel reservations simply use this option and enter a NEGATIVE number equal to some or all the shares held in reserve
QUIT — Key "5" is pressed when a player has completed his transactions

This program was not listed on the ZX printer, owing to an inability (so far) to print graphic symbols the following system of indicating graphic characters had been adopted

1 Inverse graphic letters will be in lower case. PRINT "a sample of inverse letters"
2 Graphic character will be enclosed in brackets PRINT "(gA+10gD+gA)"

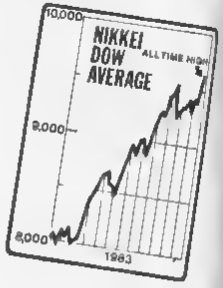
This would be typed as PRINT "[redacted]

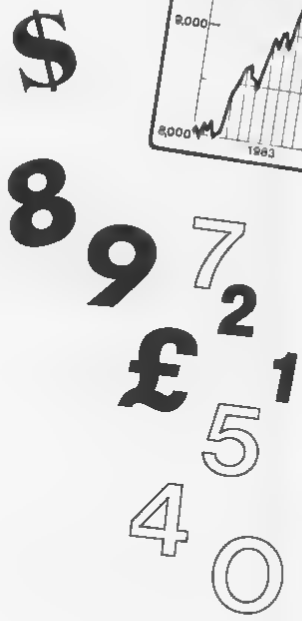
= ONE graphic character on key A. TEN graphic characters on key D and ONE graphic character on key A

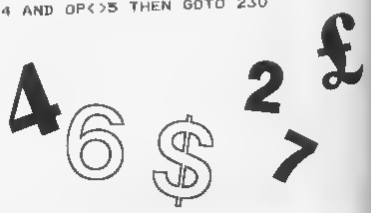
In the program the following lines contain ALL inverse characters including spaces and ? etc
LINES 5 6 23 TO 33 210 220 1050 2020 2035 2040 2520 2540 3520 3540 5020 5090, 6015 6090 TO 6120

```
 1 REM "stocks and shares"
 2 DIM A$(10,10)
 4 DIM B(10,2)
 5 PRINT AT 6,0;"(10gM+12inverse spaces+10gN)";AT 10,0;"(10gM+12inverse spaces
+10gN)"
 6 PRINT AT 8,7;CHR$ 11;"stocks and shares";CHR$ 11
 7 PRINT AT 12,2;"A GAME FOR UP TO TEN PLAYERS"
 8 PRINT AT 20,7;" HOW MANY PLAYERS?"
```

```
 9 INPUT P
10 CLS
11 IF P>10 THEN GOTO 10
12 DIM A(P,11)
13 DIM B(P,10)
15 PRINT AT 11,7;"HOW MANY ROUNDS"
16 INPUT END
23 LET A$(1)="(inverse1.)+aviation"
24 LET A$(2)="(inverse2.)+steel    "
25 LET A$(3)="(inverse3.)+shipping"
26 LET A$(4)="(inverse4.)+building"
27 LET A$(5)="(inverse5.)+finance "
28 LET A$(6)="(inverse6.)+leisure "
29 LET A$(7)="(inverse7.)+industry"
30 LET A$(8)="(inverse8.)+film ind"
31 LET A$(9)="(inverse9.)+chain st"
32 LET A$(10)="(inverse10.)+gold   "
33 LET C$=" reserved "
34 FOR N=1 TO P
36 FOR M=1 TO 10
38 LET A(N,M)=10
40 LET B(M,1)=P*40
42 LET B(M,2)=10
44 NEXT M
46 LET A(N,11)=200
48 NEXT N
49 LET RO=1
110 GOSUB 1000
120 FOR N=1 TO 10
130 PRINT AT N,17;"  ";AT N,17;B(N,2)
140 NEXT N
145 REM primary loop
150 FOR J=1 TO P
151 PRINT AT 12,0;"ROUND ";RO;" OF ";END
152 LET ST=1
154 PRINT AT 0,0;P;" PLAYING"
160 GOSUB 9700
170 PRINT AT 0,27;"  ";AT 0,27;J
175 IF RND>.8 THEN GOSUB 5000
180 GOSUB 6000
190 GOSUB 9600
200 LET ST=0
210 PRINT AT 13,0;"player";J;"your options are :-"
220 PRINT AT 14,0;"1. buy";AT 15,0;"2. sell";AT 16,0;"3. sell all";AT 17,0;"4.
reserve";AT 18,0;"5.quit"
230 INPUT OP
240 IF OP<>1 AND OP<>2 AND OP<>3 AND OP<>4 AND OP<>5 THEN GOTO 230
250 IF OP=1 THEN GOTO 2000
260 IF OP=2 THEN GOTO 2500
270 IF OP=3 THEN GOTO 3000
280 IF OP=4 THEN GOTO 3500
290 IF OP=5 THEN GOTO 8000
980 IF J=P THEN LET RO=RO+1
983 IF RO=END+1 THEN GOTO 7000
985 NEXT J
990 GOTO 150
1000 REM screen
1010 PRINT AT 0,0;"(20gA)+player)"
1020 FOR N=1 TO 10
```

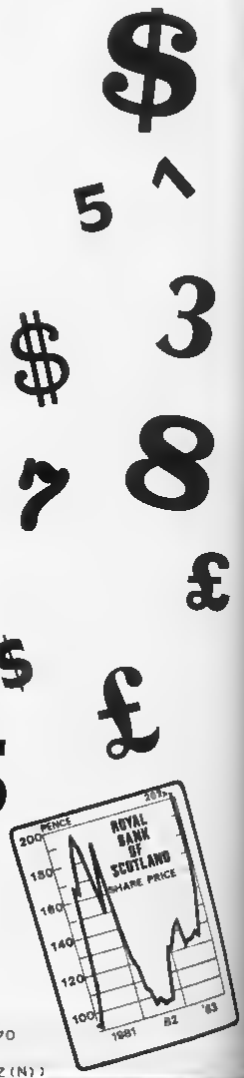




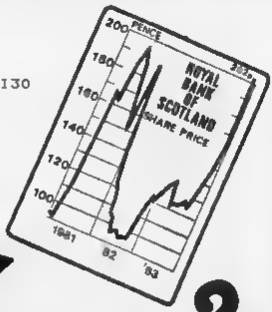


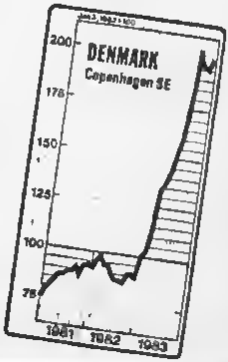
```
1030 PRINT AT N,0;A$(N);"     at#  gA+Inverse- "
1040 NEXT N
1050 PRINT AT 11,0;"                          cash#"
1060 FOR N=1 TO 10
1070 PRINT AT N,27;C$(N)
1080 NEXT N
1090 RETURN
2000 REM buy
2010 GOSUB 9600
2020 PRINT AT 13,0;"what do you wish to buy ?        (1 2 3 etc)"
2030 INPUT BU
2032 IF BU<1 AND BU>10 THEN GOTO 2030
2035 PRINT AT BU,19;"<O>"
2040 PRINT AT 13,26;BU;AT 15,0,"how many do you require ?        you can afford"
INT (A(J,11)/B(BU,2))
2050 INPUT QU
2051 IF QU>B(BU,1) THEN GOTO 2050
2052 IF QU>INT A(J,11)/B(BU,2) THEN GOTO 2050
2060 PRINT AT 15,26;QU
2070 LET A(J,11)=A(J,11)-(B(BU,2)*QU)
2080 LET B(BU,1)=B(BU,1)-QU
2090 LET A(J,BU)=A(J,BU)+QU
2100 PRINT AT BU,10;"     ";AT BU,10;B(BU,1);AT BU,22;"     ";AT BU,22;A(J,BU)
2105 PRINT AT 11,25;"        ";AT 11,25;A(J,11)
2110 PRINT AT BU,19;"gA+Inverse-+space"
2120 GOSUB 9600
2499 GOTO 210
2500 REM sell
2510 GOSUB 9600
2520 PRINT AT 13,0;"what do you wish to sell ?       (1.2.3.etc)"
2530 INPUT SE
2532 IF SE<1 AND SE>10 THEN GOTO 2530
2535 PRINT AT SE,19;"(inverse<O>)"
2540 PRINT AT 13,26;SE;AT 15,0;"how many to sell ?                "
2550 INPUT QS
2552 IF QS>A(J,SE) THEN GOTO 2550
2560 PRINT AT 15,26;QS
2570 LET B(SE,1)=B(SE,1)+QS
2580 LET A(J,SE)=A(J,SE)-QS
2590 LET A(J,11)=A(J,11)+(B(SE,2)*QS)
2600 PRINT AT SE,10;"     ";AT SE,10;B(SE,1);AT SE,22;"     ";AT SE,22;A(J,SE)
2610 PRINT AT 11,25;"        ";AT 11,25;A(J,11)
2620 PRINT AT SE,19;"gA+inverse-+space"
2790 GOSUB 9600
2800 GOTO 210
3000 REM sell all
3010 FOR N=1 TO 10
3020 LET B(N,1)=B(N,1)+A(J,N)
3030 LET A(J,11)=A(J,11)+(A(J,N)*B(N,2))
3040 LET A(J,N)=0
3060 NEXT N
3065 IF RO=END+1 THEN RETURN
3100 GOSUB 9700
3200 GOTO 210
3500 REM reserve
3510 GOSUB 9600
3520 PRINT AT 13,0;"what do you wish to reserve      (1.2.3.etc)"
3530 INPUT RE
3535 IF RE<1 OR RE>10 THEN GOTO 3530
```

```
3540 PRINT AT 13,29;RE;AT 15,0;"how many ?  "
3550 INPUT RA
3555 IF RA>((P*40)+(P*10)) THEN GOTO 3550
3558 IF RA+R(J,RE)>((P*40)+(P*10)) THEN GOTO 3550
3560 PRINT AT 15,9;RA
3570 LET R(J,RE)=R(J,RE)+RA
3580 PRINT AT RE,28;"    ";AT RE,28;R(J,RE)
3590 GOSUB 9600
3600 GOTO 210
4000 REM reserve adjustments
4001 FOR Q=J-1 TO J-(P-1) STEP -1
4003 LET Q1=Q
4005 IF Q1<1 THEN LET Q1=Q1+P
4010 FOR N=1 TO 10
4020 IF R(Q1,N)<>0 THEN GOSUB 4050
4030 NEXT N
4035 NEXT Q
4040 RETURN
4050 IF R(Q1,N)>B(N,1) THEN GOTO 4110
4060 LET A(Q1,N)=A(Q1,N)+R(Q1,N)
4070 LET A(Q1,11)=A(Q1,11)-(R(Q1,N)*B(N,2))
4080 LET B(N,1)=B(N,1)-R(Q1,N)
4090 LET R(Q1,N)=0
4100 RETURN
4110 LET A(Q1,N)=A(Q1,N)+B(N,1)
4120 LET A(Q1,11)=A(Q1,11)-(B(N,1)*B(N,2))
4130 LET R(Q1,N)=R(Q1,N)-B(N,1)
4140 LET B(N,1)=0
4160 RETURN
5000 REM dividends
5010 GOSUB 9600
5020 PRINT AT 13,0;"(8gP)+dividend+(8gP)"
5030 LET DI=INT (RND*10)+1
5040 PRINT AT 14,0;"YOU RECIEVE A DIVIDEND"
5050 PRINT AT 15,0;"ALL SHARES HELD IN..."
5060 PRINT AT 16,0;A$(DI)
5070 PRINT AT 17,0;"YOU HOLD "A(J,DI)
5080 PRINT AT 18,0;"YOU RECIEVE M"A(J,DI)*10
5090 PRINT AT 20,0;"    any key to cont     "
5100 IF INKEY$="" THEN GOTO 5100
5110 GOSUB 9600
5120 LET A(J,11)=A(J,11)+(A(J,DI)*10)
5130 PRINT AT 11,25;"        ";AT 11,25;A(J,11)
5140 RETURN
6000 REM market influence
6005 GOSUB 9600
6010 DIM I(10)
6015 PRINT AT 13,0;"market influence
6020 FOR N=1 TO 10
6030 LET I(N)=INT (RND*14+1)-7
6035 IF I(N)=0 THEN GOTO 6030
6040 NEXT N
6050 DIM Z(3)
6060 FOR N=1 TO 3
6070 LET Z(N)=INT (RND*10)+1
6075 IF N=2 AND Z(N)=Z(1) THEN GOTO 6070
6077 IF N=3 AND (Z(N)=Z(1) OR Z(N)=Z(2)) THEN GOTO 6070
6080 PRINT AT 13+N,0;A$(Z(N))
6090 IF I(Z(N))<0 THEN PRINT AT 13+N,12;"down";ABS I(Z(N))
```



```
6100 IF I(Z(N))>0 THEN PRINT AT 13+N,12;" up ";I(Z(N))
6110 NEXT N
6120 PRINT AT 18,0;"choose";Z(1);"/";Z(2);"/";Z(3)
6130 INPUT CH
6135 IF CH<>Z(1) AND CH<>Z(2) AND CH<>Z(3) THEN GOTO 6130
6140 LET B(CH,2)=B(CH,2)+I(CH)
6141 IF B(CH,2)<1 THEN LET B(CH,2)=1
6142 IF B(CH,2)>40 THEN LET B(CH,2)=40
6145 PRINT AT CH,17;"  ";AT CH,17;B(CH,2)
6150 GOSUB 9600
6155 IF ST=1 THEN RETURN
6160 FOR N=13 TO 20
6170 PRINT AT N,0;"(29A)+next player+(29A)"
6180 NEXT N
6190 RETURN
7000 REM end
7005 CLS
7010 FOR J=1 TO P
7020 GOSUB 3000
7030 PRINT AT J,0;"PLAYER ";J;" HAS ";A(J,11)
7040 NEXT J
7050 STOP
8000 REM prices
8005 GOSUB 6000
8006 GOSUB 4000
8010 FOR N=1 TO 10
8020 LET UP=INT (RND*4)
8030 LET DO=INT (RND*4)
8050 LET G=INT (RND*2)+1
8060 IF G=1 THEN LET B(N,2)=B(N,2)+UP
8070 IF G=2 THEN LET B(N,2)=B(N,2)-DO
8080 IF RND>.95 THEN LET B(N,2)=B(N,2)+UP+DO
8090 IF RND>.95 THEN LET B(N,2)=B(N,2)-UP-DO
8100 IF RND>.8 AND B(N,2)<5 THEN LET B(N,2)=B(N,2)+UP+DO
8110 IF RND>.8 AND B(N,2)>35 THEN LET B(N,2)=B(N,2)-DO-UP
8200 IF B(N,2)>40 THEN LET B(N,2)=40
8210 IF B(N,2)<1 THEN LET B(N,2)=1
8220 PRINT AT N,17;"  ";AT N,17;B(N,2)
8230 NEXT N
8240 GOSUB 9600
8300 GOTO 980
9600 REM cls
9610 FOR N=13 TO 21
9620 PRINT AT N,0;"
9630 NEXT N
9640 RETURN
9700 REM shares display
9710 FOR N=1 TO 10
9720 PRINT AT N,22;"    ";AT N,22;A(J,N)
9730 PRINT AT N,10;"    ";AT N,10;B(N,1)
9735 PRINT AT N,28;"    ";AT N,28;R(J,N)
9740 NEXT N
9750 PRINT AT 11,25;"        ";AT 11,25;A(J,11)
9770 RETURN
9800 REM display reserves
9810 FOR N=1 TO 10
9820 PRINT AT N,28;"    ";AT N,28;R(J,N)
9830 NEXT N
9840 RETURN
```





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READERS' REVIEWS

Next time anyone claims that we are a nation of illiterates I'll just let them read your letters! I have never read so much well though out, individualistic, critical literature. The old saying 'spoilt for choice' was never so appropriate – perhaps we'll run a special supplement later in the year.



For new readers this feature provides space to air your views on any software be it for the ZX80 ZX81 or ZX Spectrum If you've had a good or bad experience of any of the commercial software packages available for your micro why not write and tell us

Your reviews should contain your critical thoughts about the software and the relevant details concerning the availability of the package its price etc If you can provide any screen dumps to illustrate the review so much the better Any reviews published in this section of the magazine will be rewarded with the price of the tape you review So if you buy a cassette and send in a review that gets published you'll get your software for free!

Cyrus Is Chess Intelligent Software P D Fiddler

Rightly or wrongly many judge a computer by its ability to play a good game of chess and every self respecting micro has at least one chess program to offer Many commercial mainframe computers are not above a quick game of chess either and national pride is put on the line in organised International Computer Chess Tournaments – micros too have their own International Chess Competitions

Several chess programs have been available for the Spectrum for some time so the appearance of Intelligent Software's Cyrus Is Chess program in July accompanied by the slogan based upon the program which won the European Micro Computer Championship 1981 must arouse some curiosity especially as it comes with a 16 page User's Manual and is marketed by Sinclair who already have a chess program in their Spectrum Catalogue The Cyrus program is designed by David Levy the Scottish International Chess Master and noted chess computer expert whose programs can be found in several dedicated chess computers

How does the Cyrus program differ from its contemporaries? It is one of the few chess programs that fit into either the 16K or 48K models Side A of the cassette has two copies of the 16K version whilst side B has two copies of the 48K version with some additional features Side A (16K) loads in 90 seconds and Side B (48K) in 2 minutes The graphics are clear and they are moved using the cursor keys a flashing square is moved to the piece to be moved then entered the flashing square is then moved to the destination square and entered again The cursor method requires five key movements – the same number as the more usual E2 E4 ENTER method – but for some reason the cursor actually moving the pieces seems closer to over the board confrontation

Cyrus has eight playing levels and three problem solving levels (mate in 1 2 or 3) and the approximate times for each level are

Level 1	2 secs
Level 2	5 secs
Level 3	10 secs
Level 4	20 secs
Level 5	30 secs
Level 6	1 min 15 secs
Level 7	3 mins
Level 8	5 12 mins
P1	
P2	Computes until
P3	Mate found

Levels or sides can be changed during the course of the game and the board can be turned around but of more interest is the fact that the level times are faster than those stated for many dedicated chess computers to be found in the shops – this should mean that you can have a worthwhile game of chess without waiting too long for the computer to reply to your move The Cyrus program also enables the player to take back moves up to 80 moves in the 16K program and up to the beginning of any longer game in the 48K version The 48K program also enables a player to ask the computer to take its move back and play its next best move then second best move then third etc This means that you can cheat but of more importance to the chess enthusiast is the fact that you can use your computer to analyse various openings and positions In addition by tapping the R key you can ask Cyrus to automatically replay the game for both sides up to the present position be it a mid-game position or a final mate This is rather like watching Mastergame on television

In demonstration mode Cyrus will play both sides through a complete game at any pre set level and as a bonus there is a Human v Human mode which enables two players to use Cyrus as a chessboard and pieces This also means that a school or chess club can use Cyrus instead of a demonstration board at a quarter of the normal cost

An impressive list of features – but how well does Cyrus play? On loading Cyrus automatically sets itself to level 2 (response time 5 seconds) The manual states that the 48K version might be quicker in the opening than the 16K program as it has a larger opening book as it has been programmed with a larger repertoire of popular openings to respond quickly to anticipated moves

Impressive for a 5 second response! Cyrus then can prove a formidable opponent

Human	Cyrus
1 e4	e5
2 Nf3	Nc6
3 Bb5	a7
4 B x c6	d7 x c6
5 O – O	f3
6 d4	Be4
7 d x e5	Q x d1
8 R x d1	f x e5
9 Rd3	Bd6
10 N(b)d2	Be6
11 b3	Nf6
12 Bb2	Nd7
13 Ng5	Nc5
14 Rg3	c6
15 B x e6	N x e6
16 Rd1	O – O – O
17 Nc4	Bc5
18 Rc1	Rf8

As a further measure Cyrus was pitted against two dedicated chess computers Morphy Encore (£140) and Mini Sensory Advanced (£80) both of advanced design which think in their opponent's time At approximately the same response levels and playing Black in each case

Cyrus Level 3 defeated Mini Sensory Advanced Level 2 (29 moves)

Cyrus Level 6 had the better ▶

of the exchange and was heading for a win endgame against Morphy Encore Level 3 (44 moves)

To be fair Morphy Encore has a lot more reserves to call up having nine levels including two at tournament level but the fact that Cyrus did so well says a lot for the Cyrus Program and a Mate in Three Chess Problem was solved in a very acceptable 3 minutes

One irriteting feature of the 16K version is that it does not display the Menu of 15 options on the screen with the chess board but fills up the lower area of the screen with a rather distracting I S Chess Logo Playing strengths of the 16K and 48K versions are the same

Apart from the larger opening "book" and menu display on screen the 48K version offers

(a) The option of using a printer to print every move as it is made to produce a record after a complete game or to print out the current board position

(b) A game may be saved on tape and re entered into the computer s memory later

(c) The colours of the screen display can be changed

(d) In problem mode the 48K will display NO MATE FOUND if it cannot solve a problem in the number of moves stipulated

An unusual feature for both the 16K and 48K versions is that Cyrus will announce a DRAW if no pawn is moved or piece captured during a sequence of 50 moves or if both sides move the same pieces backwards and forwards over the same squares three times running This is in accord with the rules of chess but is a feature not to be found in many other computer chess programs In conclusion Cyrus is a strong yet flexible chess program suitable for both beginner and chess enthusiast even if you already have a chess program for your Spectrum you will be fascinated by this one!

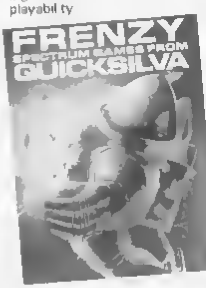
Frenzy
Quicksilva
Roy Kay

Adaptations of arcade favourites are still a major part of the micro games industry, and with FRENZY Quicksilva have produced a game that fans of the genre will recognise and enjoy

There s an infinite number of maze-like rooms for you to guide your little man around five levels of cunningly villainous robots a minelayer exploding pods – and of course the ultimate and unstoppable Evil Orville

On loading Frenzy goes into its attract mode which consists of details of play keys a score breakdown and a sample screen of yellow first level robots Controls are straightforward enough although I would have preferred bottom row keys in place of the selected curaor ones Later copies of the game will have a built in Kempson joystick option but if your game does not have this don t despair – Frenzy is included in Kempson s "Conversion Tape 2"

Depending on how nimble fingered or otherwise you are it might take you some time to get the feel of the movement keys For the f rst few plays I found it annoyingly easy to confuse up with down – in spite of the QS key overlay which is included here – thereby dooming myself to premature electrfication and losing one of my precious three lives A joystick should make a big difference to the game s playability



This brings me to my major complaint against Frenzy The game has a high score table which allows you to put a name to five high scores However, there is no preset low limit and so Frenzy thinks anything you score after loading is a GREAT SCORE! and announces it accordingly It s more than a little frustrating to have to sit through the routine colourful and tuneful as it is even when you ve only managed to score 40 points or so in the early stages of getting to grips with the game As the table works for the five highest scores in any game session you are going to have to put up with this for at least your first fives games and very probably considerably more often

Is a score table such a good idea anyway? I would hazard a guess that most people play computer games on their own and so have no real need to enter their initials as they almost certainly already know them A 'Hall of Fame' allowing you to make a copy on a printer might have been a more interesting alternative giving you the opportunity to brag about your superior skills to your wife/girl friend/boyfriend/mother/father/friends or anyone else you could persuade to listen In any event the Frenzy score table should have had an inbuilt low limit of say 600 1000 Then having a GREAT SCORE! would really have given you a glow of pride instead of as at present giving you a red glow of seething frustration

The game itself is all about getting the robots before they get you They certainly look menacing enough with their eye scanners sweeping left and right watching your every move The robots are intelligence itself particularly at the higher levels Reacting to your movements they have no intention of being sitting ducks"

You are allowed to fire only in the direction that you first moved so skilful play is needed to wipe out even all the first level robots Higher levels contain higher scores (but more devious and deadly) robots mines and exploding pods Beware of Evil Orville He materialises from the screen centre and proceeds to head straight for you and your blaster doesn t worry Orville one bit Escape is possible through one of the exits but there is also the temptation to hang around and try to finish off those last couple of robots

Frenzy at £4 95 is an enjoyable game experience and has some smashing sound effects which add greatly to its appeal It s a game that rewards repeated play giving you a real chance of building up your ability The screen layout even after several hours play never seems to repeat itself and so you have an infinite number of rooms to explore

Pity about that score table though

Sheepwalk
Virgin Games
Jim Lock

Give your laser finger a rest take time out from defending the Galaxy against marauding meanies and try your hand instead at this interesting and original game which simulates a sheepdog trial

You control a sheepdog



which tries to round up nine sheep If left for too long to their own devices the sheep will eat the corn carrots and other crops growing in the field Your dog too can damage the crops by trampling them underfoot whilst attempting to drive the sheep away Additional hazards to negotiate are two haystacks in the centre of the field and a river which takes up a large part of the left hand side of the field Your sheep of course cannot swim

When all the surviving sheep have been penned your score is given and points deducted for drowned sheep and crop damage The time taken is also displayed and points taken off for that too It is possible to end with a minus score as I did on my first attempt despite successfully penning five of the sheep

Scores do of course improve with practice and with the discovery that the dog can swim across the river

It really is an advantage to have watched One man and his dog" before you play as the game is very realistic - the sheep move in an infuriatingly lifelike manner – they will sneak out of the pen while the dog is occupied elsewhere and stampede if the dog gets too close particularly the last two sheep

The game has attractive graphics and runs in Basic at a gentle pace It is easy to master the essentials of the game but difficult to get a high score

The presentation of the cassette is however disappointing The loading instructions are well hidden (on the cassette label) and the program is only recorded on one side of the tape The other side is taken up with a boring bit of music

I would unhesitatingly recommend Sheepwalk to all armchair shepherds if it were not for the price £7 95 s too much for this game enjoyable

and original as this. How about a price reduction Virgin Games? Say to around £5.50?

Pssst
Ultimate
Jason Pick

Gardening is a hobby that I have always looked upon as being quiet and relaxing and although the theme of this game is garden flavoured no one could describe it as quiet or relaxing.

While the fairly lengthy programme is loading up comes a rather nice interesting picture to hold your attention the quality of which made me very hopeful things to come and I certainly wasn't disappointed.

After selecting joystick or keyboard one or two player options you find yourself in control of Robbie the robot who



You can move rapidly in eight directions all over the large playing area. From the bottom centre of the screen starts growing your prize flower with the wonderful name Thrygodian Mega Chrisanthodil.

There is a garden wall on each side of the screen in which there are many recesses and in these appear randomly the various sprays and items such as grow bags watering cans etc. for bonus points.

Play commences with an invasion of interstellar Space Slugs who wiggle their way slightly diagonally up and down the screen so that no matter what height they start at if left undestroyed they will all finish at the prize flower which starts to shrink back down when more than one slug settles on it. They must be destroyed by guiding Robbie to the appropriate spray (the wrong one only stuns them temporarily) making sure Robbie doesn't come into contact with either he loses one of his five lives. He clicks very neatly on to the spray can if lined up O.K. and can fire left or right with a squeaky puffy sounds. It

you can manage to keep the flower pest free for about four minutes regardless of score you will be rewarded with a nice tune and some nice graphics as the flower blooms in all its glory!

But that is the easy part after each blooming you pass on to the next stage. The Slugs are now joined by Scuttling Leeches and they sure can scuttle moving at 45 degrees up and down they are very hard to avoid and hit and of course the slug spray won't kill the leeches so you are constantly changing sprays.

Again if you can keep your flower clear for three to five minutes another blooming will take place and you can pass on to the third stage where the attack is mounted by the leeches and Menacing Midges which have a fluttering unpredictable kind of movement and needless to say require yet another type of spray.

Skill will once again bring a more difficult stage where you are presented with all three kinds of bug at the same time and changing cans while avoiding pots is quite a challenge.

Throughout the game you are randomly presented with the chance of many bonus points by picking up fly swots fertilizer etc but this means dropping the spray can and leaving the plant and Robbie undefended. Fortunately you can ignore them until your skill reaches a high enough level and you start to worry about highest scores.

If you get through five stages the music becomes more interesting and you may well face even more horrors but that is for you to find out because I'm afraid that's as far as I have got and pretty exhausting I was too I achieved a high score of twenty odd thousand but that seems almost secondary to the enjoyment that this game gives.

The number of graphics and their speed (the spray even expands three times as it moves across the screen) surely must mean the game is written in machine code.

In conclusion, this is the best game that I have tried extremely well written very entertaining and addictive and I thoroughly recommend it. The only fault I can find is that if you have to use the keyboard to play instead of a joystick you may find the keys used are a bit close together as they are all in a line next to each other on the left hand side of the keyboard and I think would have been better with the right hand on the right side of the keyboard.

But in the face of such genius it's rather a petty complaint. The cassette fly is attractive and well documented, and for £5.35 completes a very worthwhile addition to anyone's games library.

Forth
Artic
Lindsay Godfrey

Among the latest software to receive Sinclair's stamp of approval is Artic's FORTH for the 16K ZX81 or the 48K Spectrum of which I have the ZX81 version.

FORTH is another computer language which is ten times faster than BASIC and four times more compact. What makes it really powerful is the ability to make up your own functions called 'words'. Each word has a name (by which you refer to it) and a definition (what it does). Each new word is entered into the FORTH dictionary. Once a word has been entered every time you type in the name of the word its definition is carried out. You could now define another word which contains the previous word you have just entered into the FORTH dictionary or/and any other word in the dictionary so after hours of programming your brilliant program will be the definition of just one word.

The whole FORTH package is nicely presented and comes in a double sized cassette case along with a FORTH Users Manual a FORTH Editors Manual and a keyboard overlay. When the main program has LOADed it autoRUNs and greets you with

ZX81 FORTH ARTIC COMPUTING 7294 BYTES FREE

and waits for your input. The program does not use single key entry like the ZX81's BASIC and as far as numbers go you can use any base from 2 to 36.



Inside the FORTH dictionary there are already over 100 word definitions. To enter a new word into the dictionary you use for example

: used to begin a definition
PRINT the example name of the new word
FORTH the FORTH words defining what to do
; used to end a definition

If the above were entered every time you enter the name of the word ie PRINT FORTH would be printed at the top right of the screen ' ' is the FORTH word for PRINT.

At any time the contents of the dictionary can be listed using VLIST and any words you no longer want can be erased using

FORGET (name of word)

and to clear all the words you have written from the dictionary you can enter

COLD

If the worst comes to the worst and you get fed up with FORTH you can enter..

BYE

and say bye bye to FORTH as it returns you to BASIC.

The unusual thing about FORTH is that in BASIC to add two numbers together and display them you would type

PRINT 4 + 2

but in FORTH you would type

4 2 +

which means place 4 on the stack place 2 on the stack add them together placing the result on the stack and finally, print the result.

You can not do any real programming until you LOAD the EDITOR. The Editor comes after the main program in four separate parts or 'screens'. Each screen is 1K long and has a number from 0 to 32768 but only one screen can be in memory at any one time. This may seem a problem but FORTH comes complete with a fast tape routine and it only takes 30 seconds to LOAD or SAVE a screen, or rather FLUSH which is the FORTH word for SAVE.

As a screen is LOADed all the word definitions from that screen are put into the FORTH dictionary and then the next screen can be LOADed. Each screen is organised as 16 lines numbered from 0 to 15 of 64 characters. This is a method of ▶

storing memory and does not affect how you see the T V screen

The Editor gives you various commands to manipulate the screens using the line numbers a few of these commands are

(n stands for a number)
Clear screen n
Put the following text into line n
Delete line n
Insert the following text into line n
List the current screen

To get the characters shown on the keyboard overlay and in the manuals you need a Q S character board this can be confusing at times when you are looking for a character that is not there but is no real problem

However the fact that FORTH is so easy to crash is a problem You only have to type in any graphics character or the wrong word and it creshes bye bye FORTH! Another small fault is that the keyboard overlay is not all that good!

Apart from the above the FORTH package is very good and anybody who wants to learn another language should get it

FORTH costs £14 95 and is available direct from Sinclair



Sabotage
Sinclair
James Rendell

Sabotage for the ZX81 gives you your big chance to live out that 007 type dream of becoming a saboteur After loading the program which takes three minutes a well prepared opening page urges you to choose which destructive role you wish to take

There are two variations of the game and in both games the screen represents a compound in which the boxes are placed In game 1 you play the guard and must defend the randomly placed ammunition boxes At the start of the game the saboteur played by the computer spends a few seconds working out where the best place to put a charge is i e where the most boxes will be destroyed The explosions spread as a chain reaction if adjacent boxes explode When the computer has decided where to go you have twenty free moves with which you must race to intercept the saboteur Your only defence in this (somewhat one sided) battle is a truncheon which swings through a 5 x 5 area with you in the middle If you can corner the guard or prevent him reaching his prime target you get extra points but you lose them if you are caught in the blast (thank goodness it s only a game!)

Game 2 will appeal to those of us with a destructive mind Here you play the saboteur and have to blow up as many of the two hundred boxes as you can (up to a maximum of fifty) You are encouraged to try and catch the guard in the blast after all there are eight hundred points to be gained for this sociable achievement Once you have laid your charge you have ten seconds to run for it otherwise the saboteur s life expectancy is drastically reduced If at any time during your destructive mission an unbroken vertical or horizontal path develops between you and the guard he will shoot with his rifle and beware he s a crack shot You have ten charges to play with but the game ends if the guard shoots you

Overall these are entertaining strategy games The graphics are quite smooth since the bulk of the program is in machine code However the instructions are written in a rather informal manner and certain parts of the game are learnt by experience rather than by instruction

Sabotage is £4 95 and is one of the latest Sinclair releases

Espionage Island
Artic Computing
Michael Harris

Espionage Island is a large adventure game with over 50 locations to be discovered and 12 or so objects to collect on the way to be used for various purposes It features a SAVE routine so that you can stop the game where and when you like come back to it another time and carry on where you left off

The basic plot is to leave your stricken aircraft (safely and in one piece of course) explore an island get into a military installation, collect its secret escape and return to your aircraft carrier As there are a large number



of locations it really is essential that you draw a map as you go along To move from one location to another you must type in the direction required into the computer It is not necessary to type out north south up etc in as complete words – n' s u will do just as well

Anything that you come across on the way collect The computer understands simple commands usually a verb and noun like get torch the reply being OK If the object is something to wear then you must first get whatever and then wear whatever To get you started this is what you must do with a parachute in the plane at the beginning If you do not then the reply will be ' pulling you out with a rush of air You land making a large red mess You are dead Do you wish to try again? and back to the beginning you go As you get further into the game this can be extremely annoying so it is a good idea to SAVE the game every so often so you only have to go back so far This is done by typing quit and when asked if you wish to SAVE the game say y (it is not necessary to say yes I and use a blank cassette However if you say n' to the quest, then the computer is wiped clear and you have to reload the entire game A request for help (and you do have to spell this word out) more often than not tells you to try drawing a map but occasionally will give you something useful – for instance help will tell you no smoking One thing that is not clearly explained is that if you type in n' it will give a recap of your location description which can be very useful if you have typed in all sorts got nowhere and the original description has scrolled off the screen

One location that had me confused was you are in a STICHED swamp tell me what to do STICHED is a misspelling of STITCHED and if you think of a synonym for that it will tell you which direct or to go through the sinking swamp to get out on the other side If you do not get out you will eventually sink up to your neck and drown Do you wish to try again? Without giving anything away there is a point where you have to join a rope to two objects If you type tie rope it will reply what to? If you type in A and B it will reply again what to? If you then retype it as to A and B or even to A and to B then the computer will accept this but only understand the first part of it (i e to A') The correct way appears to be tie rope what to? to A , OK tie rope what to? to B This will give the right answer I can see a rope tied to A and to B

If you really get stuck with this game then a request to Artic Computing will bring a Tip sheet to help I expect they would appreciate an SAE

Espionage Island kept me occupied for several evenings and Artic are to be congratulated on producing such an interesting game I can t wait to get into the other three adventure games they produce Espionage Island requires a 48K Spectrum and costs £6 95

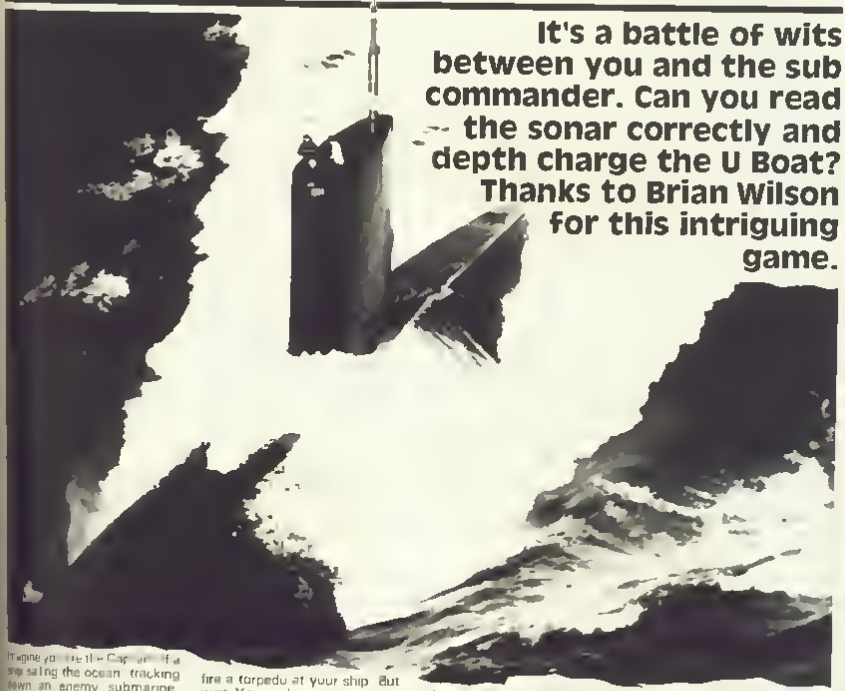
For further information on the cassettes reviewed in this article you can write to the following addresses

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Quicksilva Palmerston Park House 13 Palmerston Road Southampton SO1 1LL
Virgin Games 61 63 Portobello Road London W11
Ultimate The Green Ashby de la Zouch Leicestershire LE65 5JU
Artic Computing Main Street Brandesburton Driffield YO25 8RG
Sinclair Research Stanhope Road Camberley Surrey GU15 3PS

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Readers Reviews
ZX Computing
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Depth charge



It's a battle of wits between you and the sub commander. Can you read the sonar correctly and depth charge the U Boat? Thanks to Brian Wilson for this intriguing game.

Imagine you're the Captain of a ship sailing the ocean tracking down an enemy submarine. Your task is to hunt and destroy the sub which is not easy considering that you can't see it! Help at least is at hand in the form of sonar — the delay and pitch of the returning echo is all the information you have though. And armed with this information you must determine where you think the submarine is, set the depth charge and launch it.

Attention all shipping!

Now you didn't exactly expect the submarine commander would just sit there and wait for you to get him did you? And believe me he doesn't! He will fire a torpedo at your ship but wait. Your early warning system will give you an audible warning — can you evade the deadly weapon?

The details

In order to save over elaborate instructions in the program a training facility is built in and if you press 0 at the start the submarine will appear without being armed with torpedos and you cannot score. You need only press any other key to get going. Press 1 for sonar, press 2 to release the depth charge keys 5 and 8 move your ship and keys 6 and 7 control the depth of charge. If at any time you should get stuck just press 9 again to make the submarine appear.

Your points build up as you press a key and the aim is to get the lowest number of points. Happy hunting!

Lines		Action
40	170	Initialising and screen build up
300	320	Moves ship
350		Gives help if you go over 100
400	430	Sonar
450		Initiate torpedo warning
500	550	Set depth charge and launch
610	620	Prints submarine (help)
700	730	Charge descends
740	820	Submarine destroyed
830	895	Score diplay
900	930	Charge exploding
1000	1130	Instructions
2000	2086	Graphics
3000	3090	Torpedo warning and ship sinking

```
 10 PRINT  AT 0,11;"SUBMARINE"
 15 PLOT 88,167: DRAW 72,0
 20 PRINT  AT 10,6;"Please wait a moment."
 25 GO SUB 2000: REM graphics
 30 GO SUB 1000: REM instructions
 40 LET bs=9999
100 PAPER 1: BORDER 5: CLS
105 PAPER 7
110 FOR n=0 TO 127: PRINT " ";: NEXT n
120 LET c=15: LET sc=0: LET h=1: LET dc=3: LET k=0: LET k1=0: LET q=1
130 PRINT  AT 3,c;"ABC"
140 LET ls=7+ INT ( RND *13)
150 LET cs=1+ INT ( RND *28)
160 PRINT  AT 0,0;"DEPTH OF CHARGE       SCORE"
170 PRINT  AT 0,17;dc-3; AT 0,28;sc
300 IF  INKEY$ ="5" THEN  LET sc=(sc+1)*h: PRINT  AT 3,c;"   ": LET c=c-1*(c>0
: PRINT  AT 3,c;"ABC"
310 IF  INKEY$ ="8" THEN  LET sc=(sc+1)*h: PRINT  AT 3,c;"   ": LET c=c+1*(c<29
): PRINT  AT 3,c;"ABC"
320 PRINT  AT 0,28;sc
350 IF sc>1000 AND h=1 THEN  GO TO 610
400 LET d= INT ( SQR ((ls-3)^2+( ABS (cs-c))^2))
410 IF  INKEY$  <> "1" THEN  GO TO 450
420 LET sc=(sc+1)*h: PRINT  AT 0,28;sc
430 BEEP .1,40: FOR n=0 TO d*5: NEXT n: BEEP .1,70-d*3
450 LET k=(k+1)*h: IF k>40*q THEN  GO TO 3000
500 IF  INKEY$ ="6" THEN  LET sc=(sc+1)*h: LET dc=dc+1*(dc<21)
510 IF  INKEY$ ="7" THEN  LET sc=(sc+1)*h: LET dc=dc-1*(dc>5)
520 PRINT  AT 0,17;dc-3;" "; AT 0,28;sc;" "
530 IF dc=3 THEN  GO TO 600
540 IF  INKEY$ ="2" THEN  GO TO 700
550 FOR n=0 TO 20: NEXT n: GO TO 500
600 IF  INKEY$  <> "0" THEN  GO TO 300
610 PRINT  PAPER 1; INK 7; AT ls,cs;"DEF"
620 LET h=0: GO TO 300
700 LET sc=(sc+2)*h: PRINT  AT 0,28;sc
710 FOR n=4 TO dc-1: FOR m=0 TO 1
720 PRINT  PAPER 1; INK 7; OVER 1; AT n,c+1;"G": BEEP .3,1
730 NEXT m: NEXT n
740 IF n>ls+1 OR n<ls-1 OR c>cs+2 OR c+2<cs THEN  GO TO 900
745 FOR n=0 TO 5: PRINT  PAPER 1; INK 6; OVER 1; AT ls,cs;"DEF": BEEP .05,20: N
EXT n
750 PRINT  PAPER 1; AT ls,cs;"   "
760 FOR n=0 TO 9: PRINT  PAPER 1; INK 6; OVER 1; AT ls,cs;"HJH"
770 BEEP .05,20: NEXT n: PRINT  PAPER 1; AT ls,cs;"   "
780 FOR x=ls TO 21: FOR n=0 TO 3
790 PRINT  PAPER 1; INK 7; OVER 1; AT x,cs-1;"IKHKL"
800 IF x+1 <= 21 THEN  PRINT  PAPER 1; INK 7; OVER 1; AT x+1,cs-1;"KHJHI"
810 IF x+2 <= 21 THEN  PRINT  PAPER 1; INK 7; OVER 1; AT x+2,cs-1;"MKIKN"
820 BEEP .05,40-x*4: NEXT n: NEXT x
830 PAUSE 100: CLS : IF sc<bs*h THEN  LET bs=sc
835 PLOT 56,151: DRAW 152,0
840 PRINT  AT 2,7;"SUBMARINE DESTROYED"; AT 6,4;"Score:",sc
845 PRINT  AT 10,4;"Best Score:",bs
850 IF sc=0 THEN  LET a$="You had help no score.": GO TO 870
860 IF sc<30 THEN  LET a$="Join      the      Navy.": GO TO 870
861 IF sc<60 THEN  LET a$="      Excellent.": GO TO 870
862 IF sc<100 THEN  LET a$="      Well Done.": GO TO 870
```

STOP! Before typing in this program, please see the Editor's note in the Welcome section

```
 863 LET a$="      Try Harder.
 870 PRINT  AT 14,4;a$
 880 PRINT  AT 18,1;"Press any key for another game."
 890 PAUSE 0: FOR n=0 TO 10: BEEP  RND ,30- RND *40
 895 NEXT n: GO TO 100
 900 LET dc=3: FOR m=0 TO 7: BEEP .05,-10
 910 PRINT  PAPER 1; INK 6; OVER 1; AT n,c+1;"H"
 920 NEXT m: PRINT  PAPER 1; AT n,c+1;" "
 930 GO TO 300
1000 REM instructions
1010 PRINT  AT 10,6;"                    "
1020 PRINT  AT 2,0;"  You are on a ship that is to"''"hunt and destroy an enem
y submarine that you cannot see."
1030 PRINT  AT 6,11;"CONTROLS"; AT 8,10;"1","Sonar."; AT 10,10;"2","Releases Cha
rge."; AT 12,8;"5 & 6","Moves Ship."; AT 14,8;"6 & 7","Depth of Charge."
1040 PRINT  AT 16,0;"  To start with, and if you get"''"stuck press 0 and the sub
marine"''"will appear.  Lowest score wins."
1050 PRINT  AT 20,9;"Press any key."
1060 PAUSE 0: PRINT  AT 2,0;" "; FOR n=1 TO 136
1070 PRINT "     "; NEXT n
1080 PRINT  AT 3,0;"  Beware the submarine can "''"strike back   You will get a"'
warning sound when a torpedo"''"is comming towards you."''''
1090 PRINT "  It is your decision whether to"''"attempt to move or not.  It is"''"
a matter of luck,"''''
1100 PAUSE 0: PRINT "  This is the warning sound."
1110 FOR n=0 TO 50: BEEP .05,50: NEXT n
1120 PRINT  AT 20,22;" "; AT 21,12;"to play."
1130 PAUSE 0: RETURN
2000 REM graphics
2010 FOR q=144 TO 157
2020 FOR n=0 TO 7
2030 READ a: POKE  USR  CHR$ q+n,a
2040 NEXT n: NEXT q
2045 RESTORE : RETURN
2050 DATA 0,0,0,1,1,255,255,127
2051 DATA 0,24,24,217,255,255,255,255
2052 DATA 128,128,128,240,240,255,254,252
2060 DATA 0,0,0,0,127,255,255,127
2061 DATA 128,240,240,240,255,255,255,255
2062 DATA 0,0,0,0,249,255,255,249
2070 DATA 0,0,124,126,126,126,0,0
2080 DATA 20,82,72,32,148,1,82,84
2081 DATA 5,0,40,0,21,64,37,136
2082 DATA 9,64,36,64,32,4,32,132
2083 DATA 0,40,2,72,18,64,10,64
2084 DATA 64,16,64,8,130,40,68,34
2085 DATA 5,64,16,4,0,18,0,2
2086 DATA 85,0,84,0,136,32,20,160
3000 IF k1<4 THEN  BEEP .05,50: LET k1=k1+1: GO TO 600
3010 LET q=.5+( RND /2): LET k=0: LET k1=0
3020 LET ct=c-3+ INT ( RND *8+.5)
 30 IF c=ct OR c+1=ct OR c+2=ct THEN  GO TO 3050
 40 GO TO 600
 50 PRINT  AT 3,c;"   ": FOR n=4 TO 21: FOR m=0 TO 1
 60 PRINT  PAPER 1; INK 5; OVER 1; AT n,c;"ABC"
3070 BEEP .1,20-n*2: NEXT m: NEXT n
 80 LET sc=sc+20: LET a= INT ( RND +.5)
 90 LET c=29*a: PRINT  AT 3,c;"ABC": GO TO 300
```

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The 1K corral

A galaxy of great programs rounded up for your 1K ZX81.

Although sometimes frustrating to work within the limited confines of 1K memory, you may find it worthwhile to study how programmers have managed to use the memory space — something you may (and should) find useful even working within 16K or 48K.

If you would like to contribute material to this feature please try to explain the techniques you have employed to get your program into 1K. And now, get typing and have fun.

Minefield
Damian Swift

This is one of the best 1K games I've seen and is quite difficult to beat. You are in command of a mini-submarine which is speeding through enemy minefields. The mines are represented by "*" and your sub is the inverse ":". Using keys 6 and 7 to move up and down you must avoid the mines while staying between the surface (minus signs) and the sea bed (grey squares — graphic A's). Take care!

```
  5 FOR F=SGN PI TO INT PI
 10 CLS
 15 FAST
 20 PRINT "----------
----------",AT VAL "8",NOT PI
```

```
 25 FOR M=NOT PI TO CODE "2"
 30 PRINT AT VAL "6",M*RND+SGN PI
,RND*CODE "?"+CODE "▌"),"*"
 35 NEXT M
 40 SLOW
 45 LET D=INT (VAL "6"*RND+SGN
PI)
 50 FOR S=NOT PI TO CODE ":"
 55 PRINT AT D,S
 60 IF PEEK (PEEK 16396+PEEK 16
399*256)=CODE "*" THEN PRINT "■"
;TAB NOT PI;"DESROYED IN FIELD"
;F;AT D,S;":";E
 65 PRINT "■"
 70 LET A=D
 75 LET D=D+(INKEY$="6" AND D<(V
AL "7")-(INKEY$="7" AND D>SGN PI
)
 80 PRINT AT A,S;" "
 85 NEXT S
 90 NEXT F
 95 PRINT "YOU GOT THROUGH"
```



Smugglers
Damian Swift

Another challenging game from the 1K master. In this one you are a smuggler trying to load your orbiting spaceship with uranium. The spaceship is at the top of the screen and is moving from left to right. The supply shop which is under your control starts at the bottom on the ground. Using keys 6 and 7 to move up and down, you must fly up and dock with the tail end of the spaceship as it passes. An inverse 0 in the centre of your shuttle denotes a full load.

Just one small problem: there is also an anti-smuggler orbiting defence satellite which will destroy if you are either directly ahead or above it with a full load. Who said 1K games were easy!!!

```
  8 LET S=NOT PI
 10 LET A=8
 10 LET M=5
 20 LET H=VAL "9"
 25 LET R$=" ▌▌▌"
 30 PRINT AT PI,CODE "-","    "
AT NOT PI,CODE "$","    ",AT H-5
```

```
GN PI,CODE "■","  ",AT H+SGN PI
,CODE "■";" ",AT CODE "■",NOT
PI,"  ",AT
PI,A,"  ",AT NOT PI,H,"  ",
AT H,CODE "■",A$
  36 IF NOT H AND M<=VAL "9" AND
 M>=VAL "5" THEN PRINT AT NOT PI
,M,"■■■■";AT PI,NOT PI;"CRASHED.
SCORE=";S;E
  40 IF (M=INT PI AND A<CODE "■"
) OR (ABS (VAL "6"-A)<=SGN PI AN
D A$="■■■" AND M<PI) THEN PRINT
AT H,CODE "■","■■■■ SCORE=";S/6,E
  45 IF NOT H AND M=CODE "■" AND
 A$="■■■" THEN GOSUB CODE "■"
  50 LET M=ABS M+(INKEY$="6" AND
 M<CODE "■")-(INKEY$="7")
  56 IF M=VAL "9" THEN LET A$="■
■"
  60 LET M=M+SGN PI AND M<=CODE
 "■"
  65 LET A=A+PI/CODE "■" AND A<=
CODE "■"
  70 GOTO CODE "2"
 160 PRINT AT H,M,"■■■"
 150 LET A$="■■■"
 160 LET S=S+SGN PI
 165 RETURN
```

Emergency
J Symons

How good are your reactions? This is a variation on the reaction timer programs but with some clever techniques and a good graphic display

Mr Symons says that he developed this program for use in his school after one of his colleagues showed disdain for the "cheap toy" and spent hours on the expensive school computer only to produce a much inferior program

The program asks you to press key Z when the car appears and then displays your time. Mr Symons suggests that players start with their fingers on the table in order to get a more accurate response and eliminate cheating!

The use of this program in a school promoted much discussion and enhanced his lessons considerably

Ed's tip Why not condense lines 90 to 120 into one long line of PRINTing using TAB this should speed up the drawing of the car

VARIABLES

F — Pause interval
K — Counter for 5 repeats
J — Timing loop
T — Current time
T$ — String time, allows times to be shortened to 5 digits
B — Best time
P — Horizontal print position

```
  10 PRINT AT CODE " ",CODE "■"
"EMERGENCY  STOP"
  20 PRINT AT CODE "■",CODE "■"
"WHEN YOU SEE A CAR AHEAD","PRE
SS "Z" TO STOP"
  25 LET F=300
  30 PAUSE F
  40 CLS
  50 LET B=CODE "■"
  60 LET T=PI-PI
  70 LET K=PI/PI
  75 IF INKEY$<>"Z" THEN GOTO F/C
ODE "■"
  80 PAUSE RND+F
  85 LET P=CODE "■"
  90 PRINT AT CODE "■",P,"■■■■"
 100 PRINT AT VAL "11",P,"■■■■■■
■■■"
 110 PRINT AT VAL "12",P,"■■■■■■
■■■■"
 120 PRINT AT VAL "13",P+1,"■■"
 130 FOR J=CODE "■" TO CODE "0"
 140 IF INKEY$="Z" THEN GOTO F
 150 IF J=CODE "0" THEN PRINT AT
 VAL "15",CODE "■","CRASH SCORE
SHED"
 160 NEXT J
 300 LET T$=STR$ (J/25.6)
 305 LET T=VAL (T$( TO 5))
 310 IF T<B THEN LET B=T
 315 PRINT
 320 PRINT "TIME=",T," SECONDS",
BEST=",B
 325 PRINT
 330 PRINT "YOU TRAVEL ",T*20,
METRES"
 336 PAUSE F
 340 LET K=K+1
 345 CLS
 350 IF K=CODE "■" THEN GOTO 60
E "■"
 360 GOTO VAL "75"
```

Rubbish!
Simon Rutherford

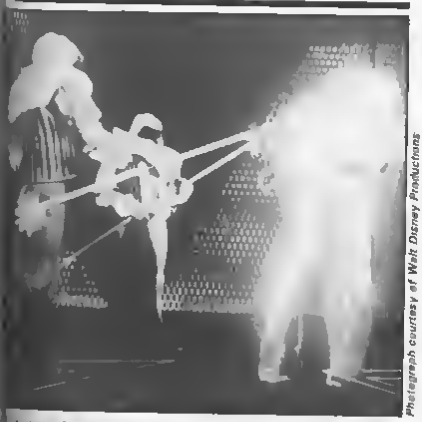
Of course I don't mean the quality of this program! In fact this is a rare item: a two player game which involves gathering cosmic garbage by driving your space bulldozer into it!

Each player takes five turns and are known as player V and player + Full instructions are included — unusual in 1K — and if you experience any problems when the program is RN then try removing them or you get an error 4 report. Otherwise call in a friend and fight it out, in a gentle way of course

```
   1 PRINT "■■■■■■■■■■■■■■■■■■■■
BLESS"
   2 PRINT "INFO, V USES  S=LEFT
,B=RIGHT"
   3 PRINT "       + USES  N=LEFT
,M=RIGHT"
   4 PRINT "YOU EACH CLEAR AS MU
CH GARBAGE  AS YOU CAN BY CRASHI
NG INTO IT."
   5 PRINT "INVERSE GARBAGE DON'T
M E BEACAUSE ITS BEEN HIT BY SOL
AR RADIATION"
   6 PRINT  "GET READY, THEN HIT
ANY KEY$"
   7 IF INKEY$="" THEN GOTO 7
   8 CLS
   9 REM GARBAGE
  10 LET X=10
  15 LET V=15
  20 LET Y=10
  25 LET W=10
  30 LET S=0
  35 LET A=0
  40 LET F=5
  45 LET T=A
```


Photograph courtesy of Walt Disney Productions

```
  50 LET F=F+1
  55 LET T=T+1
  60 PRINT AT 20,INT (RND*20);CH
R$ (INT (RND*63+1)+(128 AND RND<
.2)),AT Y,X;" ";AT U,U;" "
  80 LET U=U+(INKEY$="A" AND U<1
9)-(INKEY$="N" AND U>0)
  84 LET X=X+(INKEY$="S" AND X<1
9)-(INKEY$="S" AND X>0)
  85 SCROLL
  90 PRINT AT Y,X,"U";AT Y+1,X,
  95 LET P=PEEK (PEEK 16398+256*
PEEK 16399)
 100 PRINT AT U,U,"+";AT U+1,U,
 120 LET Q=PEEK (PEEK 16398+256*
PEEK 16399)
 130 IF P<64 THEN LET S=S+P
 140 IF Q<64 THEN LET R=R+Q
 150 IF F<100 THEN GOTO 50
 160 IF T<100 THEN GOTO 50
 170 PRINT AT 0,0;"SCORE US";S
 180 PRINT AT 1,0;"SCORE HE";R
 190 IF S>R THEN PRINT AT 2,0,"
 200 IF S<R THEN PRINT AT 2,0,"
 210 IF S=R THEN PRINT AT 2,0,"
```



Photograph courtesy of Walt Disney Productions

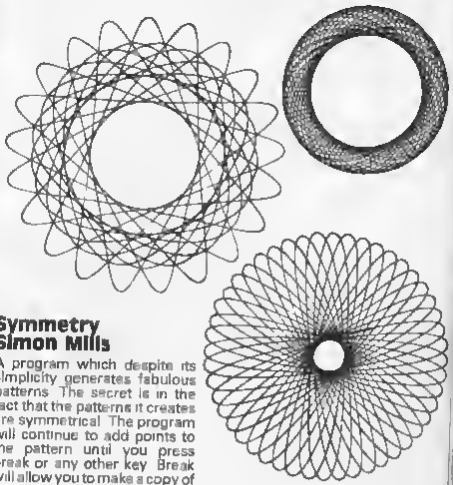
Laser defence
Rickaby and Crowley

You are on a space station on the edge of the solar system waiting for the evil alien robots (X) to attack. Can you prevent them from getting past you and attacking Earth?

Move your gun up with key 7 and down with key 6, using key 8 to fire at them and key Q to drop a bomb. The aliens attack in waves of 20 ships and to survive until the next wave you will have to destroy at least 15 of them. After each attack the amount of fuel that you have left will flash up on the screen.

May the force be with you

```
 10 LET A=0
 20 LET J=200
 30 LET K=10
 40 LET G=0
 50 LET X=INT (RND*18)+2
 60 LET A=A+1
 70 IF A=21 THEN GOTO 260
 80 LET Y=30
 90 PRINT AT K,0;CHR$ 130;CHR$
128;AT X,Y;"X"
 100 IF J=0 THEN GOTO 150
 110 IF INKEY$="7" THEN LET K=K
-1
 120 IF INKEY$="6" THEN LET K=K
+1
 130 IF INKEY$="8" THEN PRINT A
T K,2;"20 inverse spaces"
 140 IF INKEY$="5" THEN LET J=J
-1
 150 LET Y=Y-1.5
 160 IF Y=3 THEN LET G=G+1
 170 IF G=5 THEN GOTO 240
 180 IF Y=3 THEN GOTO 50
 190 IF INKEY$="8" AND K=X AND
Y<21 THEN GOTO 220
 200 CLS
 210 GOTO 90
 220 PRINT AT X,Y+1;CHR$ 160
 230 GOTO 50
 240 PRINT "DESTROYED"
 250 STOP
 260 PRINT "YOU WIN"
 270 PRINT "FUEL LEFT";J
 280 RUN
```



Symmetry
Simon Mills

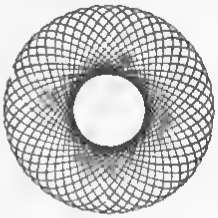
A program which despite its simplicity generates fabulous patterns. The secret is in the fact that the patterns it creates are symmetrical. The program will continue to add points to the pattern until you press break or any other key. Break will allow you to make a copy of the screen and pressing any other key will clear the screen and start again.

I have spent many minutes watching this program running

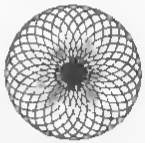
when I should have been editing!

Lines

20- 30	Generate random co ordinates
40-110	PLOT the pattern
120-130	Clear screen if key pressed



```
  1 LET C=40
 10 CLS
 20 LET A=RND*20
 30 LET B=RND*20
 40 PLOT A,B
 50 PLOT B,A
 60 PLOT C-A,C-B
 70 PLOT C-B,C-A
 80 PLOT A,C-B
 90 PLOT B,C-A
100 PLOT C-A,B
110 PLOT C-B,A
120 IF INKEY$="" THEN GOTO 20
130 RUN
```



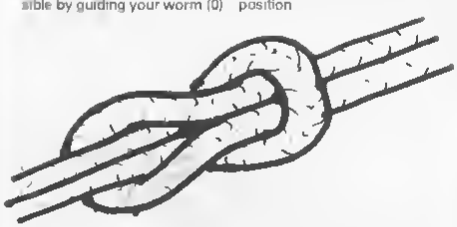
Knots
Steve Simpson

Clever programming using PEEK and POKE to the screen speeds up this program and makes it e must for the ol corral

The game itself is a variation of the old favourite "snake", but the screen display is as good if not better than many professional 1K games being sold

The object of the game is to eat as many bugs (*) as possible by guiding your worm (0) over them. As soon as you eat a bug another appears and you must go and eat that one as well. Your worm however is very unusual because it leaves a trail behind it which you cannot cross this means that the game becomes harder and harder eventually putting you in a position which is impossible to get out of

Use the cursor keys 5, 6, 7 and 8 to control your movement and press R when you finally reach that impossible position

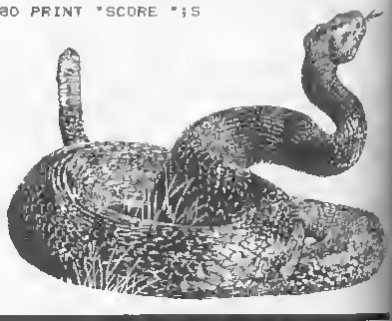


```
  5 CLS
  7 LET S=0
 10 FOR X=S TO 287
 20 PRINT "inverse space";
 30 NEXT X
 35 PRINT "SCORE ";S
 40 LET X=I+PEEK 16396+256*PEEK
16397
 50 LET J=X
 55 LET C=J+RND*297
 56 IF PEEK C<>128 THEN GOTO 55
 57 POKE C,151
 60 POKE J,156
 65 LET K=X
 70 LET X=X+(INKEY$="8")+33*(IN
KEY$="6")-(INKEY$="5")-33*(INKEY
$="7")
 75 IF INKEY$="R" THEN RUN
 80 IF PEEK X=151 THEN GOTO 200
 90 IF PEEK X<>128 THEN LET X=K
100 GOTO60
200 POKE X,156
210 LET S=S+1
220 PRINT AT 9,6;S
230 GOTO 55
```

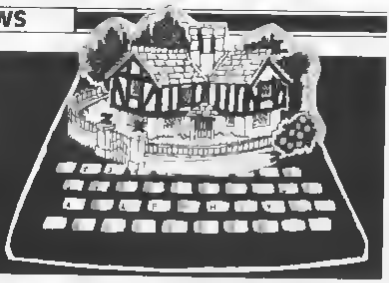
Grass snake
I R Mathias

Another of the scrolling games but this one has an increasing difficulty level. The task is to guide your snake (V) left and right keeping on the grass (.) and avoiding the weeds (*). To do this use keys 5 and 8. Note that the words in line 65 "SCROLL TO FAST FOR" are all keywords which are obtained by entering "THEN" entering the keyword and using back space and RUBOUT to remove the "THEN". This saves memory and also explains the unusual grammar. Hisssstorical shl

```
  5 LET X=9
  6 LET S=0
 10 LET X=X+(INKEY$="8")-(INKEY$="5")
 15 PRINT AT 8,X;"V";AT 9,X;
 20 LET F=PEEK (PEEK 16398+256*PEEK 163
 25 IF F=23 THEN GOTO 60
 30 IF F=14 THEN LET S=S+1
 35 PRINT AT 21,RND*10;"*:::*:.:*"
 40 SCROLL
 45 IF S=99 THEN SCROLL
 55 GOTO 7
 60 FOR X=0 TO 9
 65 PRINT AT 8,X;"I SCROLL TO FAST FOR Y
 70 SCROLL
 75 NEXT X
 80 PRINT "SCORE ";S
```



Club corner



ZX User Club

Dear ZX Computing
As far as I know, there is no ZX User Club in Geneva. Could you ask your readers if anyone would be interested in founding such a club in Geneva
Yours faithfully

Rudolf Arnold
10 Av. de Sécheron
1203 Bellvue
Geneva
Switzerland

Bits and Bytes

Dear ZX Computing
I am starting a computer club which will be called Bits and Bytes. If you join you will receive six magazines a year which will include ideas, programs, software offers and many more things. The cost would be £4.00 per year and you would receive one magazine every two months.
I am starting a club because I am interested in computers and would like to find out other peoples opinions on and about computers. Please will you publish this in ZX Computing.
Thank you
Yours faithfully

T. Boyle
If you would like more information contact me by post at

7 Beagle Ridge Drive
Fakwood Lane
Acomb
York YO2 3JH

Doncaster and District Sinclair Computer Club

Dear ZX Computing.
The Doncaster and District Sinclair Computer Club has been informed from the original Doncaster and District Users Club. I would be grateful if you would print the following notice in Club Corner.
The Doncaster and District Sinclair Computer Club holds meetings every Wednesday evening. For membership details please telephone 0302 853124.
Yours faithfully

A Cooper (Chairman),
60 Mill Lane
Warmsworth
Doncaster
South Yorkshire DN4 9RH

Universal ZX Club?

Dear ZX Computing
Would you be so kind as to publish this letter. I would like to correspond with like minded enthusiasts via tapes and in this way exchange ideas, news and programs. If I get several replies we could start a Universal ZX Club through which members could learn more about their machines.

Anyone interested should write to me at the address below giving me their full address and each person would receive details of other members.

The only condition laid down would be that each member would circulate only their own programs and I must stress the fact that no membership fees will be involved.
Yours faithfully

G J Coetzee
796 Kuyper Street
Rietfontein 0084
Pretoria
South Africa

The ZX Machine Code Users Club

The ZX Machine Code Users Club is the only machine code only club in existence for ZX81 and Spectrum users. If you remain interested in machine code or went to know more about the club please write enclosing a stamped addressed envelope to

Miss Toni Baker,
37 Stratford Road
Wolverton
Milton Keynes MK12 5LW

If you run or are a member of a user club which caters for the Sinclair user, why not get your group on the map by writing to us at

Club Corner
ZX Computing
1 Golden Square
London W1R 3AB

All you have to do is to send us a letter with details of your club's activities (times of meetings, addresses of who to contact etc.) and we'll do the rest. If you publish a newsletter or club magazine we'd very much like to see that too.

And if you don't see a club in your area why not start one up by writing to *ZX Computing* and seeing if any like minded enthusiasts wish to join you.

Valley of death

Take charge of the Light Brigade in their famous last charge invites Jerome K Laskowski.



Half a league, half a league
Half a league onward
All in the valley of Death

Cannon to right of them
Cannon to left of them
Cannon in front of them
Volley'd and thunder'd
Storm'd at with shot and shell
Boldly they rode and well
Into the jaws of Death
Into the mouth of Hell

Tennyson (The Charge of the Light Brigade)

Stirring words, stirring words indeed. It is the Battle of Balaklava, 25 October 1854, Crimean War. You are Brigadier General Lord Cardigan, and are about to lead the ill fated charge of the Light Brigade against the 30 Russian cannons in the Valley of Death below.

The display shows the hopelessness of your position — your small group of men poised ready to advance gallantly to almost certain death. The Russian guns trained on your troops at every step are lined up along all three sides of the valley — their ranges shown.

Input your order to advance L for left and forward, O for onward, or R for right and forward. The moment you step into the valley, the cannons start to volley and thunder, and the carnage begins.

Three shots are fired at you, one from left, one from in front, and one from right. Any men within range is slain, though if two are within range only the nearest is hit. Your score is reduced by the strength of any soldier shot down.

After the Enemy's three shots you may fire one shot back. Input it by giving the position of the firing soldier (A to I as shown on the right of the battlefield) and the direction he is firing in (L, O or R, as before). For example, your first shot might be AL, or HD, or IR.

Your score is increased by the strength of any cannon put out of action. However,

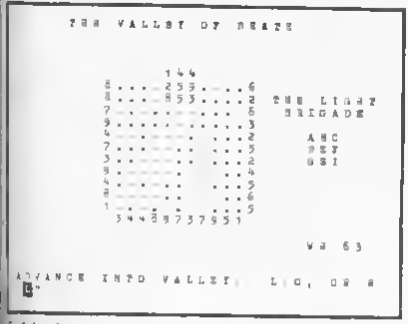


Fig 1 Initial screen display The m ial screen display (above) shows he small band of nine soldiers representing the Light Brigade about to charge against the 33 Russian guns in The valley below The first move is signalled by in putting L O or R depending on whether the first step is to be Left wards Onwards or Rightwards In the case shown above going Rightwards would seem slightly less fatal than going Leftwards or Onwards

Beware of shooting thought easily for the direction of your shot (L O or R) also determines the direction of your next step forward Thus if you shoot to the right the Brigade will automatically advance to the right.

After you have shot and the Brigade advanced the enemy gun fires thrice at you and so on

On reaching the bottom of the valley your advance automatically becomes a retreat Your aim is to get as many of your men back out of the valley alive as you can The length of any that make it is added to your score Getting even a single survivor out is no mean feat

The Brigade moves as a unit and cannot pass through the sides of the valley Even if a whole row or column is missing the Brigade cannot approach a valley side any nearer than it would if that row or column were still present

Any score above zero at the end of the game is respectable representing a moral victory The current world record to aim for is an impressive 63 – the result of a memorably heroic charge

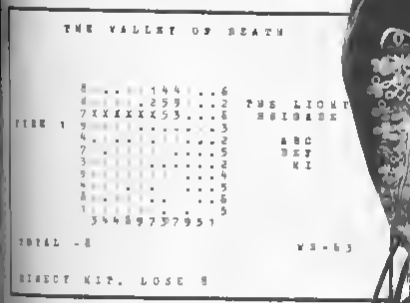


Fig 2 Cannon to left After the first step into the valley three can now fire out at the Light Brigade one from each side The first flying from left has range 7 and wishes down the men at position 3 Lose 8 points



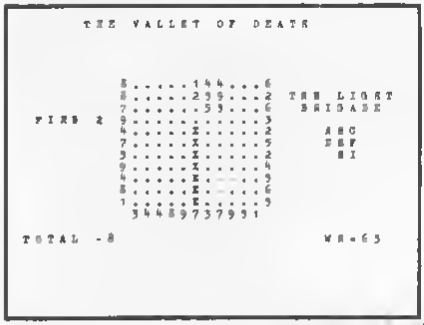


Fig 3 Cannon in front The shot from in front falls short

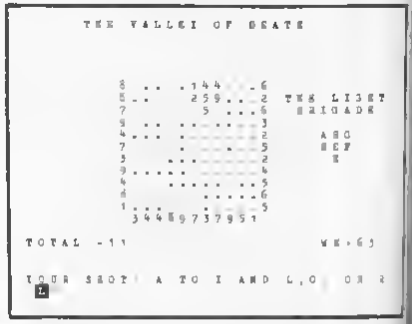
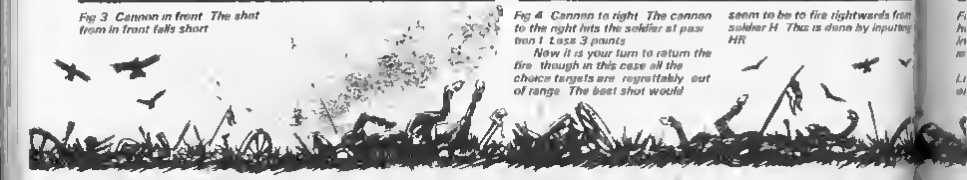
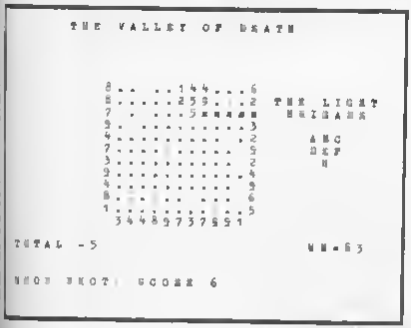


Fig 4 Cannon to right The cannon to the right hits the soldier at pas ten 1 less 3 points

Now it is your turn to return the fire though in this case all the choice targets are regrettably out of range The best shot would seem to be to fire rightwards from soldier H This is done by inputting HR



```
 10 DIM A(3,11)
 20 DIM B(3,3)
 50 RAND 0
 60 FAST
 70 PRINT TAB 5,"THE VALLEY OF
DEATH"
 80 LET MOVE=0
 90 LET FORCE=0
100 LET F=0
110 LET M=1
120 LET N=6
130 LET X=2
140 LET TOT=0
150 LET C$="
"
160 LET WR=63
170 PRINT AT 6,22,"THE LIGHT";T
AB 23,"BRIGADE",,TAB 25,"ABC",T
AB 25,"DEF",TAB 25,"GHI",AT 18,2
,"WR=";WR
180 LET B$=""
190 FOR I=1 TO 3
200 FOR J=1 TO 11
210 LET A(I,J)=INT (RND*9+1)
220 GOTO 230+(3-I)*20
250 PRINT AT 4+J,B,A(1,J),"....
.....",A(3,J)
240 GOTO 270
250 LET B$=B$+CHR$ (28+A(2,J))
260 NEXT J
280 NEXT I
290 PRINT TAB 9,B$
300 GOSUB 1200
310 SLOW
320 LET MOVE=MOVE+1
330 PRINT AT 21,0,"YOUR SHOT  A
TO I AND L,O  OR R"
340 IF MOVE=1 THEN PRINT AT 21,
0,"ADVANCE INTO VALLEY  "
345 INPUT B$
360 PRINT AT 20,0,C$,TAB 8,C$
370 IF NOT ((LEN B$=2 AND MOVE>
1 OR (LEN B$=1 AND MOVE=1)) THE
N GOTO 330
380 LET B$=B$+B$
390 IF CODE B$(2)<49 OR CODE B$
(2)>55 THEN GOTO 330
400 LET X=(CODE B$(2)-49)*3+1
410 IF MOVE=1 THEN GOTO 550
420 IF CODE B$<38 OR CODE B$>45
THEN GOTO 330
430 LET G=INT ((CODE B$-37.5)/3
)+1
440 LET H=CODE B$-37-3*(G-1)
450 IF B(G,H)<1 THEN GOTO 330
460 LET FIRE=-1
470 LET D$="*"
480 LET RANGE=B(G,H)
490 LET MI=M+G-2
500 LET NI=N+H-2
505 IF X<>2 AND MI<1 THEN GOTO
330
510 GOSUB 1400
520 IF FIRE=-1.1 THEN GOTO 330
530 IF SCORE>0 THEN PRINT AT 2
0,1;"GOOD SHOT, SCORE ";SCORE
540 GOSUB 1900
550 LET F=SGN (9.5-MOVE)
560 LET M=M+F
570 LET N=N+X-2
580 IF N>1 AND N<11 THEN GOTO
590
590 LET N=N-X+2
600 LET X=2
610 GOSUB 1200
620 LET Q1=B(3,1)+B(3,2)+B(3,3
)
630 LET Q2=Q1+B(2,1)+B(2,2)+B(
2,3)
640 IF MOVE=20 OR (MOVE=19 AND
 1<>-5) OR (MOVE=18 AND Q2<=-6)
THEN GOTO 2000
650 FOR X=1 TO 3
660 PRINT AT 21,B,C$
670 LET FIRE=1
680 LET R=3
690 IF MOVE>17 THEN LET R=20-M
695 LET Q=N+1
700 LET P=N
705 IF X<>2 THEN LET Q=M+1
710 IF X>2 THEN LET P=M+3-R
720 FOR V=P-1 TO Q
730 IF A(X,V)<>0 THEN GOTO 770
740 NEXT V
```



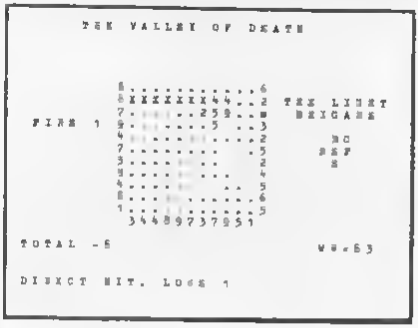


Fig 6 Revenge is sweet Your shot hits a cannon of strength 6 gain you 6 points Your total score is now 5

Having fired to the right the Light Brigade will now advance one step rightwards

Fig 5 Cannon to left again Once again the Enemy fires its three shots and once again more of your men bite the dust The first to go is the soldier at position A

And so it goes on the death toll progressively mounting

Final result. This particular charge ended unsuccessfully None survived the last man to fall being the one at position C The total score at the end was 5 which though nowhere near the world record was at least a commendable positive score

```
750 NEXT X
760 GOTO 320
765 IF X<>2 THEN LET P=M
770 IF X=2 THEN LET R=3
775 LET CANNON=INT (RND*R+2-R)
780 IF A(X,P+CANNON)=0 THEN GOT
O 770
790 LET MI=P+CANNON
800 LET RANGE=R(X,MI)
810 LET NI=MI
820 IF X=2 THEN LET MI=12
830 IF X<>2 THEN LET NI=(X-1)*2
840 LET D$="X"
850 PRINT AT 8,1,"FIRE ",X
860 GOSUB 1400
870 IF SCORE<0 THEN PRINT AT 21
0, DIRECT HIT. LOSE ',ABS SCORE
AT 8+G,24+M,'.
880 GOSUB 1900
890 IF FORCE<=0 THEN GOTO 2000
900 GOTO 750
1200 LET Z=N+7-X+2
1210 DIM C(11,11)
1250 PRINT AT 3+M-F,Z,'...",TAB
Z,"...",TAB Z,"...";AT 3,Z,"
";TAB Z,"...";
1260 Z=Z-3
1270 FOR G=1 TO 3
1280 FOR M=1 TO 3
1290 IF MOVE>0 THEN GOTO 1320
1300 LET B(G,M)=INT (RND*9+1)
1310 LET FORCE=FORCE+B(G,M)
1320 IF MOVE,17 AND B(G,M)=-1 AN
D M+G-2<1 THEN LET B(G,M)=-28
1330 PRINT AT 2+M+G,6+N+M,CHR$
(B(G,M)+
1340 IF M+G-2>0 THEN LET C(M+G-2
,N+M-2)=B(G,M)
1350 NEXT M
1360 NEXT G
1370 RETURN
1400 LET SCORE=0
1410 FOR S=1 TO RANGE
1420 LET T=-5*FIRE
1430 LET U=5*(2-X)*FIRE
1435 IF X<>2 THEN LET T=0
1440 PRINT AT MI+T+4,NI+U+8,D$
1450 IF NI+U<1 OR NI+U>11 OR MI+
11 THEN GOTO 1490
1460 IF C(MI+T,NI+U)<2 THEN GOT
O 1550
1470 NEXT S
1480 RETURN
1490 LET RANGE=S-1
1500 LET Y=MI
1510 IF X<>2 THEN LET Y=NI
1520 LET SCORE=A(X,Y)
1530 LET A(X,Y)=0
1540 RETURN
1550 IF FIRE=-1 THEN GOTO 1650
1570 LET RANGE=S
1580 LET G=MI+T-M+2
1590 LET H=NI+U-N+2
1600 LET SCORE=-B(G,H)
1610 LET FORCE=FORCE+SCORE
1620 LET B(G,H)=-1
1630 LET C(M+G-2,N+M-2)=0
1640 RETURN
1650 LET FIRE=-1.1
1655 PRINT AT 20,0,"ILLEGAL SHOT
  """;D$(1 TO (LEN D$)/2),"""; T
RY AGAIN
1657 PRINT TAB 0,"IN A SECOND"
1660 GOSUB 1200
1670 RETURN
1900 LET TOT=TOT+SCORE
1910 PRINT AT 18,0,"TOTAL ",TOT
;"  "
1920 IF RANGE=0 THEN RETURN
1930 LET D$="."
1935 PRINT AT 8,1,"
1940 GOSUB 1400
1950 RETURN
2000 PRINT AT 19,0,"END OF CHARG
E ";TAB 0,"NO SURVIVORS"
2010 IF FORCE>0 THEN PRINT AT 20
,0,"SURVIVORS ",FORCE," ADDED TO
 SCORE"
2020 LET SCORE=FORCE
2030 GOSUB 1900
2040 PRINT AT 21,0,"WORLD RECORD
 REMAINS UNCHANGED"
2050 IF TOT<UR THEN PRINT AT 21,
12,"BERTEN, WELL DONE"
2060 STOP
```

Problem page



Peter Shaw, Mr Computer, deals with your programming problems.

Dear Peter
I already have a ZX Spectrum and Interface 1 and have recently bought a BBC Micro A friend of mine made me a cable so I could connect the RS232 of the Spectrum to the RS432 on the BBC Now I have this set up how do I send programs from the Spectrum to the BBC?

Clive Giffy neant
Fairfield
Liverpool

Clive
The BBC and Spectrum with Interface are directly compatible and providing your cable is correctly wired up you can send programs over in the following manner on the BBC type...

**FX 5 2 select serial input/output*
**FX 2 1 get input from RS432 port*

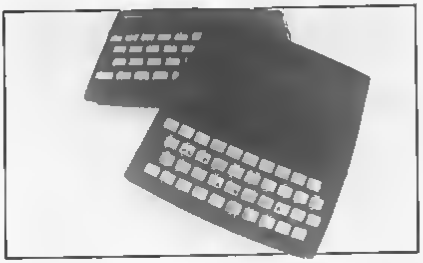
on the Spectrum type,

OPEN #4 ;"t"
LIST #4

The program will squirt down the cable and appear on your BBC Once the Spectrum has finished with the O K report press BREAK on the BBC and then type

OLD (return)
LIST (return)

Hey presto, there's your program
You will now need to go through it taking out the spaces between GO TO, GO SUB etc and any other changes that the program needs



Dear Peter,
I have been getting extremely frustrated recently over the quality of my display Is it possible to get a monitor for the Spectrum which I can use on other systems if I decide to expand?

Tim Freddrick
Shephards Bush
London W12

Dear Tim,
What you are after is the Microvitec Cub 452 1431 MZ which is exactly the same as the monitor used on the BBC by Acorn, except that it also has a Spectrum interface You may have seen Sinclair using them at Computer fairs You can get details from Microvitec Futures Way, Bolling Road Bradford, West Yorkshire BD4 7TU

Dear Peter,
I have been using a Spectrum at school for over a year now (I hope to get one for Christmas) but have never had a chance to find out what some of the commands do For example the commands ATTR ABS IN OUT and POINT I have only had time to glance at the manual and have never taken much notice of these commands Could you help?

John Conner
Ashford
Middlesex

John
Your best bet is to buy a book which will teach you BASIC and explain all these commands in detail Programming your ZX Spectrum (Interface) is one of the best of these, also Getting Started on your Spectrum (Futura) and The ZX Spectrum (Granada)
To get back to your current problem ATTR (x,y) returns the attribute of the character square x,y ABS x returns the absolute value of x i e the positive value IN x returns the number in the port x OUT x puts a number through port x Unlike PEEK and POKE these values are always changing depending on the system
POINT (x y) returns 1 if pixel x y is set and 0 if it is reset

Dear Peter
I have been using the Tasword Two recently but find the Spectrum keyboard impossible to use Can you advise me on buying a full typewriter keyboard for my machine

Joan Rutherford
Goes
Zealand
The Netherlands

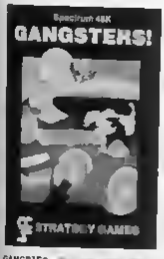
Joan
Liverpool based Fuller Micro have two types of keyboard for the Spectrum The first the FD42 is a nice unit, but not a fully professional typewriter style and costs £29 95 The FDS is a much more professional keyboard (although they are difficult to get hold of at the moment) and is priced at £49 95 DkTronics have a keyboard which is nearly as good as the FDS for £45 and I believe Kayde still make a keyboard for the Spectrum although I do not know how much it costs

To all of you who wish to start your computer club please remember that you can get one of the Staines and Stanwell Computer Club's information sheets on starting your own club by sending an SAE to

Computer Club Info Sheet
c/o Problem Page
ZX Computing
1 Golden Square
London W1R 3AB

If you are sending your SAE with a problem, please mark the envelope COMPUTER CLUB INFO SHEET to save any confusion.

BOX CLEVER



GANGSTER [illegible]



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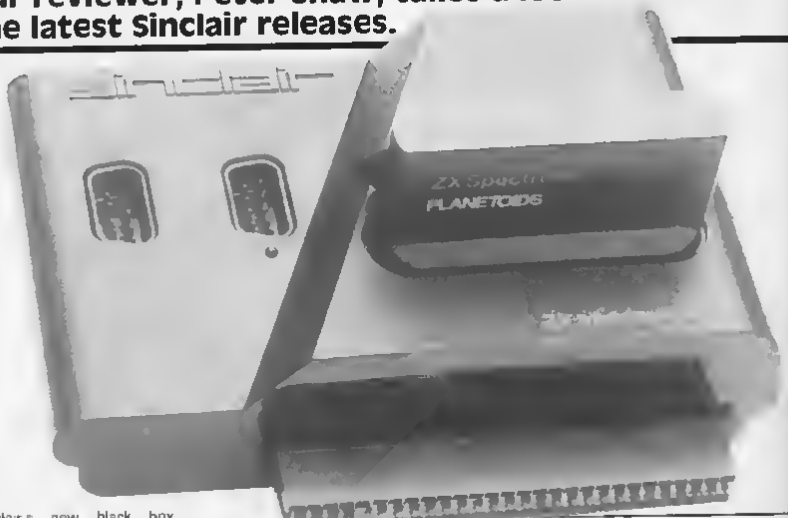
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Interface 2

Our reviewer, Peter Shaw, takes a look at one of the latest Sinclair releases.



Sinclair's new black box appeared while we were still trying to get over the Microdrive launch ROM software is something Sinclair users will not have come in contact with unless they have a video game machine and even then there are many differences

The facts

Before I go on, I'll explain exactly what the Interface 2 is A two joystick interface + ROM cartridge software socket, contained within a small black box oddly shaped with a stepped level which is difficult to describe without you actually seeing one

The ROM cartridge idea was pretty smart although the software that is available at the moment is obviously biased towards the game player I would have preferred to see a word processor like Tasword, or a dissassembler like Zeus on cartridge These sort of programs are more suited towards the ROM slot Obviously you cannot 'save' your own programs on cartridge and with commercial cartridges at £14 95 I doubt whether anybody will have more than three cartridges in their collection

The physical shape of the cartridges and the way they are connected to the slot is very odd The cartridge has a red plastic skirt' which rides up to reveal an edge connector on the Interface itself there is a female connector below a plastic door' In theory the cartridge simply plugs in the female connector, just by pressing the cartridge in It took me some time to get one of the cartridges in the right place I don't think it's going to do the Interface a lot of good with all these users shoving their cartridges in willy nilly

The joystick Interface will accept any 9 way D type connector Joystick, ie the Atari or Kempston sticks The joystick connectors are protected by two small covers which took me all of two days to lose Joysticks can be plugged into, and unplugged from the computer at any time without causing it to crash

Joysticks 1+2 work on the keys 1-0 in the following way The instructions supplied with the Interface was not without many errors, carefully corrected with a black biro

Key	Joystick 1	Key	Joystick 2
1	Left	6	Left
2	Right	7	Right
3	Down	8	Down
4	Up	9	Up
5	Fire	0	Fire

Of course, in BASIC you could not read more than one key at a time using the INKEY$ command But you can use the IN command.

IN 63486	Joystick 1	IN 61436	Joystick 2
bit 4	Fire	bit 0	Fire
bit 3	Up	bit 1	Up
bit 2	Down	bit 2	Down
bit 1	right	bit 3	right
bit 0	left	bit 4	left

A conclusion

The Interface is pretty good value at only £19 95 but the cartridges are very pricey at £14 95 It might be worth buying the Interface just for the joystick interface, which are obviously become standard. Sinclair Research 25 Willis Road Cambridge CB1 2AQ.

Patience

Have you got the patience to play Mike Eida's excellent card game program?

The started life as a programming exercise but soon developed into a challenge When finished I not only had a good game but had also used just about every programming procedure in the book – it was this that made me think that it would be useful to others who may be struggling a bit

The game played is the standard Patience There are seven piles of cards each having one more card than that to its left The first pile has only one card and the last card on each pile is face up The remaining cards form a reserve To play any card may be placed on top of another of the other colour and it must be one less in value ie nine of clubs on ten of hearts You win with four columns from King down to Ace You may play a variation whereby the Aces are placed above the play and you can put on each Ace the next card of that suit In this case you win by having four complete suits

The game starts by the ZX81 telling you what it is doing and laying out the starting position with only seven cards showing If you cannot go press NEWLINE and one of the reserve cards will be shown If that card is used the card under it becomes visible and is playable if required The reserve cards are turned over in threes You have lost when no more moves are possible At this point an input of R will give a shuffle and a new deal

To place one card on another type first the card to be moved followed by the card to be covered To put an Ace above the playing area input it alone The same applies to build on the Ace The program will not let you cheat and is utterly mugproof Be warned – if you input a card that is not visible or try to place one card in the middle of a line then the computer won't play!!

How it works

Now lets see how it all works The pack of cards is made in lines 2 to 35 It resides in the string C$ Many programs use an array at this point but that at times makes it harder to use later on Line 2 is essential to initialise the string as to tell the computer to expect it Then when it gets to line 25 the C$ after the = won't cause an error Also in this line we use the handy adding or concatenation (horrible word) of strings This just makes C$ equal to one string containing the various titles In this part two loops are used one inside and the other to join the numbers of the cards to the suits which are in strings E$ and B$ The first time through the loop B$(N) will be H and will remain so while E$ takes on the values of A to K as M goes from 1 to 13 Only then will the program run past line 30 and let N increase to 2 When complete C$ will = AH2H3H JSOSKS

Lines 40 to 70 shuffle the pack just made First a loop is set up the length of C$ (52 cards – 2 letters per card = 104) and we want to look at each card in turn – STEP 2 Line 45 follows A to take on a random number from 0 to 103 inclusive Now the beginning of each card name in string C$ is an odd number from the start so line 50 makes A always odd If it were even then the statement would be true INT the whole number part of the division would equal the division A/2 and A would be increased by one making it odd Line 55 stores the first card in our string in D$ This is only a temporary store The first card in the string C$ is even then changed for the card selected by the random A We now have two cards the same so line 65 lets the random card be equal to what was the first card from the temporary store D$ By the time N reaches 104 the pack is well and truly shuffled

Lines 74 to 93 set up variables to be used later Z is made equal to the start of the display file plus 86 This is the address of the beginning of the third line on the screen when the game is displayed so the computer will know where to start looking for the cards

The next loop (lines 95 to 109) prints the card to the screen C specifies the line and B the column into which the card is placed C$ (A TO A+1) but only if it is the first card in that line line 100 sees to that Line 103 prints the blanks and puts the CHR$ A so the computer knows which card is hidden In this way we are playing with a real pack and not with randomly selected cards This may be more important for some games A is then increased by two to look at the next card in C$ Line 114 changes the line, 115 spaces the cards and 117 reduces the number of cards in each line Line 120 checks to see if D has reached 0 and if not it goes back for more cards This works thus IF variable is not zero THEN carry this out

V$ contains the rest of the cards not dealt There is nothing after the word TO The computer will assume to the end of the string If we don't tell it where to stop

Line 130 will let us INPUT a card to the game

Getting into action

Now we come to a series of instructions so that the input can be translated into actions 131 shuffle and deal again 135 not enough input do it again 136 if a king is to be moved to an empty column and the game rules state that ONLY a king may do this then do it 137 to make sure the cards are of the other colour The codes of H and D are odd and C and S are even so only one of each pair together will come out odd If they are even then input again 138 a subroutine explained later 139 V$ is the reserve pack if it has all gone the next line won't work to skip it 140 is the first card you input is the one showing on the reserve pile then another subroutine is required This time GOSUB may be used instead of GOTO because the program will always come back to 142 ie the subroutine will not send it elsewhere If it did then return addresses would pile up on the GOSUB stack and clog the memory with information that would never be used 142 prepare another string

Another loop from 144 to 150 This one looks at the cards on the screen Remember we set Z earlier on Now if we add N to it we can look along the screen lines for the card we want If we PEEK the address of a spot on the screen we will get the CODE of whatever is printed there 0 is a space 145 if a space then next one please 146 we're using X here to say whether we're looking at teh first card in the input A$ or the second 0 is the first card Well if A$ is only one card LEN + 2 how can it be the second one we look at? This is because it is a card already laid in the game and we want to put it on its suit pile above the playing area 147 if the first card equals a card in the game go to a subroutine 148 if it's one card skip the next line 149 if the second card equals one on the game go to sub routine

When this loop ends and we reach 155 it must mean that one or other cards did not exist You've been caught cheating!!

Lines 160 and 168 move the selected card and uncover the one beneath 160 if the card above the one picked is not a covered card then subroutine It finds the one above by taking 33 from the present position There are 32 characters to each line and each line is followed by a Newline character so that the memory knows where the lines end 161 if we try to move a card to its suit pile and it's not on the end of a column then input again 162 & 163 rub out the card to be moved 164 Y has collected a value from a subroutine the card is the top one in a column then go to subroutine IF +33 = 0 (a space) it must be the top Line 160 told us there was no card above 166 & 167 look at the blank above the wiped out card and read its CODE We put that there earlier so that we knew which card was hidden This will tell us where it is in C$ Now we have to convert it the card in C$ that is to CODE so that it may be POKEd 168 to blank out the extra character used for face down cards 167 if there are more cards under the one just rubbed out go to subroutines to remember them 188 add one to X 169 zero Y 190 if we have not looked at both cards of the input go back and look at the second one 191 we've looked at both go back for more input

On the other hand

192 & 193 a subroutine to print two full stops at the top of an empty column 197 to 202 all the second cards of the input come here If the second input is not ' then 33 is added You are now looking at the line below the rubbed out first card and if it s not blank (line 200) then you are try ng to place one card on another cheating AGAIN!!!! If the second entry is then 197 will look at the line above and line 198 will cancel it and look at the correct line to find the dots 199 if the dots are there go ahead and print the King The fact it is a King has been checked already — we ll get to that sub routine later

201 and 208 prints the rubbed out card and any that were below it beneath the card selected by the second input That is the second card of the input A$ 201 & 202 print rubbed out card 203 if no more cards under rubbed out card go back to say second part of operation complete ie X now is 2 204 get next line ready 205 & 206 print next card in Z$ 207 let Z$ equal what it was less the first card already printed 208 if there are more cards in Z — go back and print them 209 Z$ is empty go back — operation complete

220 & 230 is one of the routines to find out which suit the first card is by comparing it with B$

237 & 238 subroutine to put a single card on its suit pile above the game N is the suit found above times 3 then POKE it in position two lines above the game Z 66 and along N times suit spaces along that line

252 to 255 subroutine to select a card from the reserve pack and print it below the game 252 move along 3 cards 253 is F gets too small start at the beginning again 254 is V$ is empty don t try to print it in the next line 255 print the card where indicated

280 to 295 subroutine to rub out reserve card used and print in its place the one underneath 280 the card printed is V$ IF TO F+1) this line removes it from V$ 282 if V$ is empty then skip the lines used to print it 284 F must be at least 3 so that V$(F−2) may be printed 286 print the card one less than V$(F TO F + 1) is the one underneath 287 adjust F so that the next card printed from the reserve will be 3 on from the underneath card and not from the original 293 let user know reserve pack is empty 294 let computer know that step is completed 295 go to line after GOSUB statement that brought us to line 280 in the first place

300 to 307 is a loop to make sure the two cards in input A$ are only one number different and that the first one is the lower 301 if there are two cards in input skip the next two lines 302 if there is one card and it's not an Ace and there are no cards already laid above the game then you can t do it 303 this is a way of re using the IF statement If there is something in the suit pile above the game and is the card is not the next one as compared with string E$ then you can t do it 304 if only one card skip the next line 305 if the numbers of the two input cards do not follow correctly start again

Checking up

Now the last loop was looking for those cards which were NOT correct Loops are usually used to find items which satisfy criteria but using it this way round allows us to use the same loop twice and send the correct items in each pass to different places in the program 308 if X is not zero go to one place 310 if X therefore is zero then go to another

315 to 325 are statements to show cheating and to stop the game There must eventually be some punishment for persistent

330 this has been put here purposely to show that a SAVE statement ned not be put at the end of the program If you start your tape and enter GOTO 330 then NEWLINE the program will be saved with the title 'P When you play it back with LOAD "P it will do so when it sees the 335 RUN without listing the program first This can be very important with programs which have variables stores in memory and these are needed to make it work RUN will destroy all memory so if you put GOTO after the SAVE statement then you won t rub them out in error

Lines 350 to 355 end sub routine — all inputs come here to find out if there are cards above or below 350 identify blank above — top of column 351 one card only in input and it s not the bottom card in column 1 legal. 352 give value to Y so that the difference can be seen between a blank above the first card entered exposed card above or a covered card above.

Having played the game and studied the program with these notes it is hoped that not only do you understand how it works but that the various methods used will enable you to write better programs yourself

```
   1 PRINT "I AM MAKING AND SHUF
FLING A PACK OF CARDS TO PLAY ""P
ATIENCE""!"
   2 LET C$=""
   5 LET B$="HCDS"
  10 LET E$="A23456789TJQK"
  15 FOR N=1 TO 4
  20 FOR M=1 TO 13
  25 LET C$=C$+E$(M) +B$(N)
  30 NEXT M
  35 NEXT N
  39 PRINT "I AM SHUFFLING THE P
ACK NOW"
  40 FOR N=1 TO 104 STEP 2
  45 LET A=INT (RND*104)
  50 IF A/2=INT (A/2) THEN LET A
=A+1
  55 LET D$=C$(N TO N+1)
  60 LET C$(N TO N+1)=C$(A TO A+
1)
  65 LET C$(A TO A+1)=D$
  70 NEXT N
  72 CLS
  73 LET F=1
  75 LET Z=PEEK 16396+PEEK 16397
*256+66
  90 LET C=3
  91 LET B=0
  92 LET D=7
  93 LET A=1
  95 FOR N=1 TO 1
 100 IF N>1 THEN GOTO 103
 101 PRINT AT C,B+3*N;C$(A TO A+
1)
 102 GOTO 108
 103 PRINT AT C,B+3*N;"h"+CHR$ A
+"h"
 108 LET A=A+2
 109 NEXT N
 114 LET C=C+1
 115 LET B=B+3
 117 LET D=D-1
 120 IF D THEN GOTO 95
 125 LET V$=C$(57 TO )
 128 LET Y=0
 130 INPUT A$
 131 IF A$="R" THEN GOTO 38
 132 IF LEN A$=1 OR LEN A$=3 THE
N GOTO 130
 133 IF A$="" THEN GOTO 250
 134 LET X=0
 135 IF LEN A$=2 THEN GOTO 138
 136 IF A$(1)="K" AND A$(3)="." 
THEN GOTO 139
 137 IF (CODE A$(2)+CODE A$(4))/
2=INT ((CODE A$(2)+CODE A$(4))/2
) THEN GOTO 130
 138 GOTO 220
```

```
 139 IF LEN V$=0 THEN GOTO 142
 140 IF A$(1 TO 2)=V$(F TO F+1)
THEN GOSUB 280
 142 LET Z$=""
 144 FOR N=1 TO 16*33 STEP 33
 145 IF PEEK (Z+N)=0 THEN GOTO 1
50
 146 IF X=1 AND LEN A$=2 THEN GO
TO 220
 147 IF X=0 AND PEEK (Z+N)=CODE
V$ AND PEEK (Z+N+1)=CODE A$(2) T
HEN GOTO 160
 148 IF LEN A$=2 THEN GOTO 150
 149 IF X=1 AND PEEK (Z+N)=CODE
A$(3) AND PEEK (Z+N+1)=CODE V$(4
) THEN GOTO 197
 150 NEXT N
 155 G TO 315
 160 IF PEEK (Z+N-33)<>136 THEN
GOTO 350
 161 IF LEN A$=2 AND PEEK (Z+N+3
3)=118 THEN GOTO 130
 162 POKE Z+N,0
 163 POKE Z+N+1,0
 164 IF Y AND PEEK (Z+N+33)=0 TH
EN GOTO 188
 166 POKE Z+N-33,CODE C$(PEEK (Z
+N-32))
 167 POKE Z+N-32,CODE C$(PEEK (Z
+N-32)+1)
 168 POKE Z+N-31,0
 187 IF PEEK (Z+N+33) THEN GOTO
210
 188 LET X=X+1
 189 LET Y=0
 190 IF X<>2 THEN GOTO 144
 191 GOTO 130
 192 POKE Z+N,27
 193 POKE Z+N+1,27
 194 GOTO 187
 197 IF A$(3)="." THEN LET N=N-3
3
 198 LET N=N+33
 199 IF PEEK (Z+N)=27 THEN GOTO
201
 200 IF PEEK (Z+N) THEN GOTO 320
 201 POKE Z+N,CODE A$
 202 POKE Z+N+1,CODE A$(2)
 203 IF Z$="" THEN GOTO 188
 204 LET N=N+33
 205 POKE Z+N,CODE Z$
 206 POKE Z+N+1,CODE Z$(2)
 207 LET Z$=Z$(3 TO )
 208 IF Z$<>"" THEN GOTO 203
 209 GOTO 188
 210 LET Z$=Z$+CHR$ (PEEK (Z+N+3
3))+CHR$ (PEEK (Z+N+34))
 211 POKE Z+N+33,0
 212 POKE Z+N+34,0
 214 LET N=N+33
 215 GOTO 187
 220 FOR N=1 TO 4
 225 IF B$(1 TO 2)=A$(1 TO 2) THEN GOTO 30
0
 230 NEXT N
 237 POKE Z+N*3-66,CODE A$
 238 POKE Z+N*3-65,CODE A$(2)
 239 GOTO 130
 252 LET F=F+6
 253 IF F>LEN V$ THEN LET F=1
 254 IF V$="" THEN GOTO 130
 255 PRINT AT 18,8;V$(F TO F+1)
 265 GOTO 130
 280 LET V$=V$(1 TO F-1)+V$(F+2
TO )
 282 IF V$="" THEN GOTO 295
 284 IF F<3 THEN LET F=3
 286 PRINT AT 18,8;V$(F-2 TO F-1
)
 287 LET F=F-2
 293 IF V$="" THEN PRINT AT 18,4
;"RESERVE PACK EMPTY"
 294 LET X=X+1
 295 RETURN
 300 FOR M=1 TO LEN B$-1
 301 IF LEN A$=4 THEN GOTO 304
 302 IF PEEK (Z+N*3-66)=0 AND A$
(1)<>"A" THEN GOTO 130
 303 IF PEEK (Z+N*3-66)=CODE B$(
M) THEN IF A$(1)<>B$(M+1) THEN G
OTO 130
 304 IF LEN A$=2 THEN GOTO 307
 305 IF A$(1)=B$(M) AND A$(3)<>B
$(M+1) THEN GOTO 130
 307 NEXT M
 308 IF Y THEN GOTO 237
 310 GOTO 179
 315 PRINT "THAT CARD DOES NOT F
IGHT.  I DO NOT PLAY WITH cheats
"
 321 STOP
 330 PRINT "I don't TRYING TO
FOOL ME CARDOVER AND THER. I AM N
OT PLAYING  ANYMORE."
 335 STOP
 339 SAVE "P"
 345 RUN
 350 IF PEEK (Z+N-33)=0 THEN GOT
O 192
 351 IF PEEK (Z+N+33)=0 AND LEN
A$  2 THEN GOTO 130
 352 LET Y=1
 354 IF PEEK (Z+N+33) THEN GOTO
130
 355 GOTO 162
```

The Patience listing which occupies 4.25K including variables and screen
Lower case underlined = Graphics on key
Lower case = Inverse characters Words run together will be separated by computer changing lines

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Pelmanism

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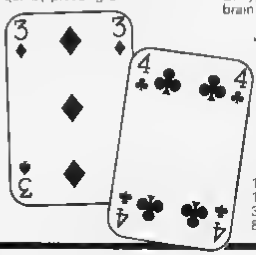
Can you match the card values with as much skill as your opponent? You need to remember the positions of as many cards as possible to win the game — memory training exercises have never been so much fun!

A pack of cards is shuffled and spread out face down and the players take turns in choosing a pair of cards to turn over. If the card values match then the player wins a point if not then they're turned back and you will have to remember their positions for your next attempt.

Once the computer has dealt the cards and given each a value the players can begin by choosing their pairs of cards. To move to the card you have chosen use key 5 to go left and 8 to go right. Once you have reached the card of your choice 0 turns it over. If at any time you want to stop playing you can quit by pressing Q.



So type in this program, put your brain into gear and away you go!



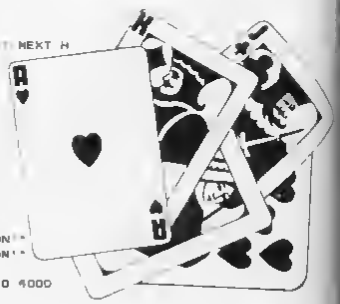
The lines

4	5	Sets up user defined variables
20	60	Deals the cards
63	140	Shuffles the cards
159	300	Checks input for cursor movement, quit or turn card, perform movement of cursor
403	420	Turns over the card (if legal)
450	484	Eliminates a matched pair
1000	1500	Prepares for the next players turn
1510	1530	Checks for end of game
3000	4030	End of game routine
8000	8120	Instructions

```
  4 RESTORE 8: FOR a= USR  CHR$ 144 TO ( USR  CHR$ 149)-1: READ B: POKE A,B: NE
XT A
  5 DATA 142,145,145,145,145,145,145,142,0,102,255,255,255,126,60,24,16,56,56,1
24,124,56,56,16,24,24,126,255,126,126,60,24,8,8,107,127,107,8,28,28
 10 BORDER 7: PAPER 7: INK 0: CLS
 12 GO SUB 8000: CLS : LET M=0: LET N=0: LET C=1
 15 PRINT  AT 0,0; FLASH 1;"DEALING .PLEASE WAIT"
 17 DIM A$(8,13): LET I=0
 20 FOR P=1 TO 4: FOR G=1 TO 13. LET A$(P,G)="m": NEXT G: NEXT P
 25 FOR p=14 TO 6+I3*16 STEP 16
 30 FOR d=10 TO 160 STEP 40
 40 PLOT p-1,s-4: DRAW 0,34: DRAW 13,0: DRAW 0,-34: DRAW -13,0
 50 NEXT d
 60 NEXT p
 63 PRINT  AT 0,0; FLASH 1;"SORTING .PLEASE WAIT"
 65 FOR D=1 TO 4
 70 FOR X=1 TO 13
 90 LET S= INT ( RND *4)+1
100 LET R= INT ( RND *13)+1
110 IF A$(S,R) <> "m" THEN  GO TO 90
120 IF x<10 THEN  LET A$(S,R)= CHR$ (48+X)
122 IF x >= 10 THEN  LET A$(S,R)=( CHR$ 74 RND x=11)+( CHR$ 75 AND x=12)+( CHR$
81 AND x=13)+( CHR$ 144 AND x=10)
125 IF x=1 THEN  LET a$(s,r)="A"
127 LET a$(s+44,r)=("S" AND d=1)+("C" AND d=2)+("D" AND d=3)+("E" AND d=4)
130 NEXT X
140 NEXT D
145 BEEP .5,20: PRINT  AT 0,0;"                              "
150 LET P=3. LET G=2
155 FOR G=1 TO 2
160 PRINT  PAPER 5; INK 0; FLASH 1; OVER 1; INK 1; AT P-1,9;"■"; AT p+2,9;"■"
175 LET g$= INKEY$ . IF g$="" THEN  GO TO 175
```

STOP! Before typing in this program, please see the Editor's notes in the Welcome section.

```
 177 PRINT  AT P 1,B;" "; AT P+2,B;" "
 180 IF  INKEY$ ="q" OR  INKEY$ ="Q" THEN  GO TO 3000
 190 LET B=B+12 AND  INKEY$ ="E"): IF B>26 THEN  LET B=2: LET P=P+5: IF P >= 20
THEN  LET P=3
 200 LET B=B-12 AND  INKEY$ ="S"): IF B<2 THEN  LET B=26: LET P=P-5: IF P<3 THEN
  LET P=18
 250 IF  INKEY$ ="O" THEN  GO TO 400
 300 GO TO 140
 403 IF G=2 AND R=P AND S=B THEN  GO TO 140
 404 IF A$((P-3)/5+1,B/2)="X" THEN  GO TO 140
 405 FOR k=0 TO 10 STEP 5: BEEP  .008,k: NEXT k
 407 IF B=1 THEN  LET R=P: LET S=B
 410 PRINT  AT P,B;A$( INT ((P-3)/5)+1,B/2)
 413 IF A$( INT ((P-3)/5)+5,B/2)="C" OR A$( INT ((P-3)/5)+5,B/2)="E" THEN  INK 2
 415 PRINT  AT P+1,B;A$( INT ((P-3)/5)+5,B/2)
 417 INK 0
 420 NEXT B
 425 FOR E=0 TO 150: NEXT E
 430 PRINT  AT R,S;" "; AT R+1,S;" "; AT P,B;" "; AT P+1,B;" "
 440 IF A$((P-3)/5+1,B/2) <> A$((R-3)/5+1,S/2) THEN  GO TO 1000
 450 FOR k=-10 TO 35 STEP 4: BEEP .01,k: NEXT k
 455 LET C=C+1
 460 LET A$((R-3)/5+1,S/2)="X": LET A$((R-3)/5+5,S/2)="X": LET A$((P-3)/5 COPY 1
,B/2)="X": LET A$((P-3)/5+5,B/2)="X"
 470 PRINT  AT R,S;"X"; AT R+1,S;"X"; AT P,B;"X"; AT P+1,B;"X"
 473 IF V=1 THEN  LET M=M+1
 476 IF V=2 THEN  LET N=N+1
 480 IF V=1 THEN  PRINT  AT 0,0;"PLAYER 1:";M
 482 IF V=2 THEN  PRINT  AT 0,20;"PLAYER 2:";N
 484 PAUSE 50
1010 LET C=C+1
1015 IF  INT (C/2)=C/2 THEN  LET V=2
1020 IF  INT (C/2) <> C/2 THEN  LET V=1
1030 LET H$="PLAYER ": FOR H=1 TO 7: PRINT  AT H+5,30;H$(H): NEXT H
1040 PRINT  AT 13,30;V
1500 LET O1=0
1510 FOR U=1 TO 4: FOR Y=1 TO 13
1520 IF A$(U,Y)="X" THEN  LET O1=O1+1
1530 NEXT Y: NEXT U
1540 IF O1 >= 52 THEN  GO TO 3000
1550 GO TO 150
3005 FOR z=0 TO 2
3010 FOR u=0 TO 30 STEP 4
3020 BEEP  .01,u
3030 NEXT u: NEXT z
3045 GO SUB 9400
3050 IF M>N THEN  PRINT  BRIGHT 1; AT 11,5;"PLAYER 1 HAS WON!"
3060 IF N>M THEN  PRINT  BRIGHT 1; AT 11,5;"PLAYER 2 HAS WON!"
3070 IF N=M THEN  PRINT  BRIGHT 1; AT 11,9;"IT S A DRAW!"
4000 INPUT " ANOTHER GAME ? "; LINE N$: IF N$="" THEN  GO TO 4000
4010 IF N$(1)="Y" OR N$(1)="y" THEN  RUN
4020 IF N$(1)="N" OR N$(1)="n" THEN  STOP
4030 GO TO 4000
8000 CLS
8010 PRINT  TAB 10;"PELMANISM"
8020 PRINT  TAB 10;"_________"
8030 PRINT
8040 PRINT
8050 PRINT " CAN YOU MATCH THE CARD VALUES"
8060 PRINT : PRINT "WITH MORE SKILL THAN YOUR "; PRINT . PRINT "OPPONENT ?"
8070 PRINT " PRINT " YOU WILL NEED TO REMEMBER THE ". PRINT : PRINT "POSITIONS O
F AS MANY CARDS AS" PRINT " PRINT "POSSIBLE TO WIN THE GAME."
8080 PRINT ; PRINT " TO MOVE CURSOR,USE S   LEFT                          D - RIGH
T"
8085 PRINT : PRINT " USE 'O' TO TURN A CARD OVER"
8090 PRINT " PRINT "PRESS 'Q' TO QUIT GAME"
8100 PRINT AT; FLASH 1;"PRESS ANY KEY"
8110 PAUSE 0
8120 RETURN
9400 FOR q=4 TO 1: FOR w=1 TO 13
9700 IF a$(q+4,w)="D" OR a$(q+4,w)="C" THEN  LET i=2
9800 PRINT  AT 21-q*5+2,w*2;A$(R,w); INK i; AT 21 q*5+3,w*2;a$(q+4,w): LET i=0
NEXT w: NEXT q
9810 RETURN
```



step by Step

A game of luck and skill — fill in each rung with a suitable number. M Savin shares it with us. Can you beat my best score of 8?

So you'd like to climb the ladder of success fame and fortune? Well we can t help you to quite achieve those heady heights but here is a great game to test your skill and judgement So let s take it one step at a time and keep alert

The aim

When you RUN the game the computer will draw a ladder with numbers down the side from 0 to 9



63 Y or N?

The computer then chooses a number from 0 to 99 and it prints

63 Y or N?

The cunning computer has chosen the number 63 and now expects you to type Y (for yes) or N (for no)
Should you type N a different number is chosen but you lose one point from your score
If you type Y to the number 63 the micro will then print

WHICH BOX WOULD YOU LIKE THE NUMBER 63 TO GO IN (0 TO 9)?

All you then have to do is type in a number 0 to 9 The aim of the game is to get as many numbers on the ladder as possible in ascending order — and you only get the one chance Rejecting a number will cost you points and making a wrong decision will limit your future choices

Your score stands initially at 10 and the most that we manag ed was 8 so see if you can do better!

```
  1 INK 1: GO TO 1000
  2 LET a=5
  4 LET j=10
  5 DIM b(j)
  6 BORDER 7: PAPER 7: CLS
  7 PRINT  AT 0,a;" ■■"
  8 FOR m=1 TO 2
  9 FOR v=0 TO 19
 10 POKE 23609,255
 11 PRINT  AT v,a-1;"■"
 12 NEXT v
 13 LET a=12
 14 LET v=0
 15 NEXT m
 18 LET a=5
 19 LET I=1: FOR n=I TO 9: PRINT  AT 1,a-I; CHR$ 142;"■■■■■■■": LET I=1+2: NEXT
n
 20 INK 2
 21 PRINT  AT 2,a;" ■■"
 22 INK 3
 23 LET w=9: LET q=0: FOR u=1 TO 10: PRINT  AT q,a-3;w;"_": LET q=q+2: LET w=w-
1: NEXT u
 30 PRINT  AT 4,a;" ■■"
 31 INK 4
 40 PRINT  AT 6,a;" ■■"
 41 INK 5
 50 PRINT  AT 8,a;" ■■"
 51 INK 6
 60 PRINT  AT 10,a;" ■■"
 61 INK 0
 70 PRINT  AT 12,a;" ■■"
 71 INK 1
 80 PRINT  AT 14,a;" ■■"
```



```
  81 INK 2
  90 PRINT  AT 16,a;"  ■■"
  91 INK 3
 100 PRINT  AT 18,a;"  ■■"
 101 LET y=0
 105 FOR x=0 TO 9
 110 LET b(j)= INT ( RND #99)
 115 PRINT  AT 0,20; FLASH 1; INK 3;"score=";y
 116 IF y=10 THEN  GO TO 200
 117 LET y=y+1
 120 PRINT  AT 20,0;"                    "; FLASH 1; INK 0;b(j);"  Y or N?"; INVER
SE 0; FLASH 0;"                                  "
 122 LET b$= INKEY$ : IF b$="n" THEN  LET x=x+1: IF b$="n" THEN  LET y=y-1: IF b
$="n" THEN  GO TO 110
 123 IF b$="y" THEN  GO TO 126
 124 IF b$="s" THEN  GO TO 200
 125 GO TO 120
 130 INK 0: PRINT  AT 20,0;"WHICH BLOCK WOULD YOU LIKE THE"; AT 21,0;"  NUMBER '
;b(j);" INK 0;" TO GO IN (0 TO 9)?"
 131 INK 2
 133 INPUT a$
 134 IF a$="" THEN  GO TO 110
 135 IF a$="1" THEN  PRINT  AT 16,a;"  "; INVERSE 1;b(j)" LET j=j-1
 136 INK 1
 137 IF a$="2" THEN  PRINT  AT 14,a;"  "; INVERSE 1;b(j): LET j=j-1
 138 INK 0
 139 IF a$="3" THEN  PRINT  AT 12,a;"  "; INVERSE 1;b(j): LET j=j-1
 140 INK 3: IF a$="0" THEN  PRINT  AT 18,a;"  "; INVERSE 1;b(j): LET j=j-1
 141 INK 6
 142 IF a$="4" THEN  PRINT  AT 10,a;"  "; INVERSE 0; PAPER 6; INK 0;b(j): LET j=
j-1
 143 INK 5
 144 IF a$="5" THEN  PRINT  AT 8,a;"  "; INK 0; PAPER 5;b(j): LET j=j-1
 145 INK 4
 146 IF a$="6" THEN  PRINT  AT 6,a;"  "; INK 0; PAPER 4;b(j): LET j=j-1
 147 INK 3
 148 IF a$="7" THEN  PRINT  AT 4,a;"  "; INVERSE 1;b(j): LET j=j-1
 149 INK 2
 150 IF a$="8" THEN  PRINT  AT 2,a;"  "; INVERSE 1;b(j): LET j=j-1
 151 INK 1
 152 IF a$="9" THEN  PRINT  AT 0,a;"  "; INVERSE 1;b(j): LET j=j-1
 153 INVERSE 0
 154 NEXT x
 155 FOR s=1 TO 10
 156 IF b(s)=0 THEN  GO TO 170
 158 NEXT s
 160 NEXT x
 161 IF b(1)<b(2) THEN  GO TO 169
 162 IF b(3)<b(4) THEN  GO TO 169
 163 IF b(5)<b(6) THEN  GO TO 169
 164 IF b(7)<b(8) THEN  GO TO 169
 165 IF b(9)<b(10) THEN  GO TO 169
 168 GO TO 170
 169 CLS : FLASH 1: PRINT  AT 10,0;"TRY AGAIN I THINK YOU MADE A        MISTAKE!!
!": BEEP 10,-14: FLASH 0: RUN
 170 INK 0: PAPER 4: BORDER 3: CLS : FOR v=1 TO 20: BEEP .1,v: NEXT v
 200 CLS : FLASH 1: PRINT  AT 10,8;"your score was ";y
 201 IF y >= 8 THEN  PRINT  AT 12,10;"WELL DONE!!!": FOR g=1 TO 20: BEEP .05,g:
NEXT g
```

SPECTRUM GAME

```
210 FLASH 0
220 INK 0: PRINT  AT 20,0;"would you like to play again?": IF  INKEY$ ="n" THEN
 STOP
221 PRINT  AT 21,0;"Press Y for 'yes' N for 'no'": IF  INKEY$ ="n" THEN  STOP
225 IF  INKEY$ ="y" THEN  RUN 2
230 GO TO 220
1000 PAPER 6: INK 0: BORDER 2: CLS : PRINT  AT 0,2;"@ M. Savin 1982"; FLASH 1; A
T 10,10;"***LADDERS***"
1001 FOR y=1 TO 10
1002 FOR o=1 TO 3
1003 BEEP .1,y
1004 BEEP .1,0
1005 NEXT o: NEXT y
1006 BEEP 3,11
1007 PAPER 7
1008 CLS
1009 INK 2
1010 PRINT  AT 0,7;"***INSTRUCTIONS***"
1020 PRINT
1030 INK 0: PRINT "   The ZX Spectrum will choose  ten numbers which you have to
  place on the ladder in order,the lowest number should be at the bottom of the
ladder and the    highest at the top.When you see the 'L' press a key from 0-9
and then press the key 'ENTER'      which is on the keyboard on the right hand si
de If you get 7    numbers on the ladder you have      done very well!!"
1040 PRINT
1045 FLASH 1
1050 PRINT  AT 20,5;"Press any key to start"
9997 PAUSE 0
9998 FLASH 0
9999 GO TO 2
```



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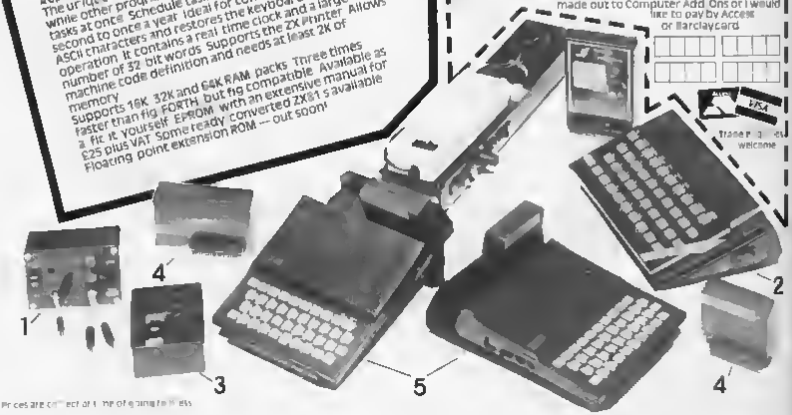
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I enclose cheque/postal order for made out to Computer Add Ons or I would like to pay by Access or Barclaycard



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Lost!

Escape the maze in this exciting program from Pete Cooke of Stoneygate.



Imagine you are trapped in a maze full of poisonous gas and you have to get out into the open air before your air canister runs out and exposes you to the deadly atmosphere. Well just type this program into your trusty ZX81 and you'll have to imagine no longer!

There are brief instructions provided within the program although all you really need to know are the keys you need to move around the maze. To go forwards you press the 7 key to go left press the 5 key and to move right press the 8 key. Lots of luck — you're going to need it!

Line by line

Here's a very brief breakdown of what the various lines in the listing do

Lines 100 230	Form the main loop which receives the player's moves and calls the subroutine at lines 1000 1430 which subsequently works through the maze calling at the print subroutines between lines 2000 and 3285
Lines 4000 5000	Check to see if you have succeeded in getting out of the maze and offer you the option of another game
Lines 7000 onwards	Print up the instructions and set up the plan of the maze

Variables

Here listed are the main variables used throughout the listing

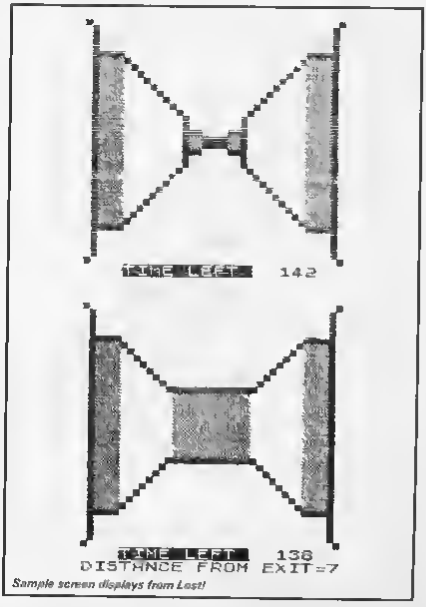
A$ (27 27)	Grid of the maze
CHR$ 0	Wall
CHR$ 130	Path
P(8 2)	Shows four directions N S E and W (each is doubled up to simplify checking in the maze)
U and V	Your co-ordinates in the maze
X and Y	Used to work through the maze
FX and FY	Forward direction
LX and LY	Left direction
P and Q	Position of exit

```
  1 REM ****MAZE****
  2 RAND
  3 GOSUB 7000
100 GOSUB 1000
110 LET Z=CODE INKEY$-28
120 IF Z<5 OR Z>8 THEN GOTO 110
130 IF Z=7 THEN GOTO 200
140 IF Z=6 THEN GOTO 100
150 IF Z=8 THEN LET D=D+1
160 IF Z=5 THEN LET D=D-1
170 IF D>7 THEN LET D=4
180 IF D<2 THEN LET D=5
190 GOTO 100
200 IF CODE A$(U+P(D,1),V+P(D,2
))=0 THEN GOTO 100
210 LET U=U+P(D,1)
220 LET V=V+P(D,2)
230 GOTO 100
1000 FAST
1010 CLS
1020 LET FX=P(D,1)
1030 LET FY=P(D,2)
1040 LET LX=P(D-1,1)
1050 LET LY=P(D-1,2)
1060 LET X=U
1070 LET Y=V
1080 GOSUB 2000+CODE A$(X+LX,Y+L
Y)
1090 GOSUB 2010+CODE A$(X-LX,Y-L
Y)
1100 REM
1110 LET X=X+FX
1120 LET Y=Y+FY
1130 IF A$(X,Y)=" " THEN GOTO 30
00+(30 AND X=P AND Y=Q)
1140 GOSUB 2020+CODE A$(X+LX,Y+L
Y)
1150 GOSUB 2030+CODE A$(X-LX,Y-L
Y)
1160 REM
1170 LET X=X+FX
1180 LET Y=Y+FY
1190 IF A$(X,Y)=" " THEN GOTO 30
60+(30 AND X=P AND Y=Q)
1200 GOSUB 2040+CODE A$(X+LX,Y+L
Y)
1210 GOSUB 2050+CODE A$(X-LX,Y-L
Y)
1220 REM
1230 LET X=X+FX
```

```
1240 LET Y=Y+FY
1250 IF A$(X,Y)="  " THEN GOTO 31
20+(30 AND X=P AND Y=0)
1260 GOSUB 2060+CODE A$(X+LX,Y+L
Y)
1270 GOSUB 2070+CODE A$(X-LX,Y-L
Y)
1280 REM
1290 LET X=X+FX
1300 LET Y=Y+FY
1310 IF A$(X,Y)=" " THEN GOTO 31
80+(30 AND X=P AND Y=0)
1320 GOSUB 2080+CODE A$(X+LX,Y+L
Y)
1330 GOSUB 2090+CODE A$(X-LX,Y-L
Y)
1340 REM
1350 LET X=X+FX
1360 LET Y=Y+FY
1370 IF A$(X,Y)=" " THEN GOTO 32
40+(30 AND X=P AND Y=0)
1380 GOSUB 2100+CODE A$(X+LX,Y+L
Y)
1390 GOSUB 2110+CODE A$(X-LX,Y-L
Y)
1400 GOSUB 2250-CODE A$(X+FX,Y+F
Y)
1410 LET T=T-1
1412 SLOW
1415 IF INKEY$=" " THEN PRINT AT
19.8 [illegible] ,T
1416 IF U=P-1 AND V=0 THEN GOTO
4000
1420 IF INKEY$=" " AND RND).6 THE
N PRINT AT 20,5, DISTANCE FROM E
XIT=" INT (ABS (U-P)+ABS (V-0))
1425 IF T=0 THEN GOTO 5000
1430 RETURN
2000 PRINT AT 0,5, [illegible] ,AT 16,5, [illegible]

2005 RETURN
2010 PRINT AT 0,24, [illegible] ,AT 16,24,
[illegible]
2015 RETURN
2020 PRINT AT 1,6, [illegible] ,AT 2,7, [illegible]
AT 17,6, [illegible] ,AT 16,7, [illegible]
2025 RETURN
2030 PRINT AT 1,23, [illegible] ,AT 2,22,"
[illegible] .AT 17,23, [illegible] .AT 16,22, [illegible]
2035 RETURN
2040 PRINT AT 3,6, [illegible] ,AT 4,9, [illegible]
AT 15,8 [illegible] ,AT 14,9, [illegible]
2045 RETURN
2050 PRINT AT 3,21 [illegible] ,AT 4,20,"
[illegible] AT 15,21, [illegible] ,AT 14,20, [illegible]
2055 RETURN
2060 PRINT AT 5,10 [illegible] ,AT 6,11,"
[illegible] ,AT 13,10 [illegible] .AT 12,11, [illegible]
3065 RETURN
2070 PRINT AT 5,19, [illegible] ,AT 6,18,"
[illegible] AT 12,18, [illegible] .AT 13,19 [illegible]
2075 RETURN
2080 PRINT AT 7,12 [illegible] ,AT 11,12,
[illegible]
2085 RETURN
2090 PRINT AT 7,17, [illegible] ,AT 11,17,
[illegible]
2095 RETURN
2100 PRINT AT 8,13, [illegible] ,AT 10,13,
[illegible]
2105 RETURN
2110 PRINT AT 8,16, [illegible] ,AT 10,16;
[illegible]
2115 RETURN
2120 PRINT AT 9,14,"[illegible]
2125 RETURN
2130 PRINT AT 1,5, [illegible] ,AT 17,5,"[illegible]
[illegible]
2135 RETURN
2140 PRINT AT 1,24, [illegible] ,AT 17,24;
[illegible]
2145 RETURN
2150 PRINT AT 1,5, [illegible] ,AT 2,5," [illegible]
[illegible] ,AT 3,5, [illegible] ,AT 4,5, [illegible] ,AT
5,5, [illegible] ,AT 6,5, [illegible] ,AT 7,5," [illegible]
[illegible] AT 8,5, [illegible] ,AT 9,5," [illegible]",AT
10,5, [illegible] ,AT 11,5, [illegible] ,AT 12,
5, [illegible] .AT 13,5, [illegible] ,AT 14,5, [illegible]
[illegible] AT 15,5, [illegible] ,AT 16,5," [illegible]",
AT 17,5, [illegible] .
2155 RETURN
2160 PRINT AT 1,24 "[illegible] ,AT 2,23,
[illegible] ,AT 3,22, [illegible] ,AT 4,22, [illegible]
,AT 5,22, [illegible] ,AT 6,22, [illegible] ,AT
7,22 [illegible] ,AT 8,22, [illegible] AT 9,22
[illegible] ,AT 10,22, [illegible] AT 11,22
[illegible] ,AT 12,22, [illegible] ,AT 13,22 [illegible]
[illegible] ,AT 14,22, [illegible] ,AT 15,22, [illegible]
.AT 16,22, [illegible] .AT 17,24, [illegible]
2165 RETURN
2170 PRINT AT 3,7, [illegible] ,AT 4,7, [illegible]
[illegible] ,AT 5,7, [illegible] ,AT 6,7, [illegible] ,AT
7,7, [illegible] ,AT 8,7 [illegible] ,AT 9,7,
[illegible] ,AT 10,7 [illegible] ,AT 11,7, [illegible] ,
AT 12,7 [illegible] ,AT 13,7 [illegible] ,AT 1
4,7, [illegible] ,AT 15,7,
2175 RETURN
2180 PRINT AT 3,22, [illegible] ,AT 4,20,"
[illegible] AT 5,20 "[illegible] ,AT 6,20 [illegible]
.AT 7,20 "[illegible] ,AT 8,20 [illegible] AT
9,20 [illegible] ,AT 10,20, [illegible] AT 11,
20 [illegible] ,AT 12,20, [illegible] ,AT 13,20
[illegible] ,AT 14,20, [illegible] AT 15,22,
[illegible]
2185 RETURN
2190 PRINT AT 5,9, [illegible] ,AT 6,9, [illegible]
[illegible] AT [illegible] ,AT 8,9," [illegible] ,AT
9,9 [illegible] ,AT 10,9 [illegible]",AT 11,9,
[illegible] AT 12,9." [illegible]" AT 13,9," [illegible]
2195 RETURN
2200 PRINT AT 5,20,"[illegible]",AT 6,18,
[illegible]",AT 7,18 [illegible] ,AT 8,18, [illegible]
.AT 9,18 [illegible] ,AT 10,18 [illegible] ,AT
11,18, [illegible] ,AT 12,18, "[illegible] AT 1
3,20,
2205 RETURN
2210 PRINT AT 7,11, [illegible] ,AT 8,11,
[illegible] ,AT 9,11,"[illegible] ,AT 10,11, [illegible] ,
AT 11,11, [illegible]
2215 RETURN
2220 PRINT AT [illegible] 17, [illegible] ,AT 8,17,
[illegible] ,AT 9,17,"[illegible] ",AT 10,17, [illegible] ,
AT 11,17,"[illegible]
2225 RETURN
2230 PRINT AT 8,12, [illegible] ",AT 9,12,
[illegible] ,AT 10,12,"
2235 RETURN
2240 PRINT AT 8,16, [illegible] ,AT 9,16,
[illegible] ,AT 10,16,"
2245 RETURN
2250 PRINT AT 8,14, [illegible] ,AT 9,14,
[illegible] ,AT 10,14,"
2255 RETURN
3000 PRINT AT 1,6 [illegible]
[illegible]
3005 FOR N=2 TO 16
3010 PRINT AT N,6,[illegible]
[illegible]
3015 NEXT N
3020 PRINT AT 17,6, [illegible]
[illegible]
3025 GOTO 1410
3030 FOR N=1 TO 17
3035 PRINT AT N 6, [illegible]
[illegible]
3040 NEXT N
3045 GOTO 1410
3050 PRINT AT 2,6,'[illegible]
[illegible]
3065 FOR N=3 TO 15
3070 PRINT AT N,8, [illegible]
[illegible]
3075 NEXT N
3080 PRINT AT 15,8, [illegible]
[illegible]
3085 GOTO 1410
3090 FOR N=3 TO 15
3095 PRINT AT N,8, [illegible]
[illegible]
3100 NEXT N
3110 GOTO 1410
3120 PRINT AT 4,10,'[illegible]'
```

```
3125 FOR N=5 TO 13
3130 PRINT AT N,10,"
3135 NEXT N
3140 PRINT AT 14,10,"
3145 GOTO 1410
3150 FOR N=5 TO 13
3155 PRINT AT N,10,"
3160 NEXT N
3165 GOTO 1410
3180 PRINT AT 6,12,"
3185 FOR N=7 TO 11
3190 PRINT AT N,12,"
3195 NEXT N
3200 PRINT AT 12,12,"
3205 GOTO 1410
3210 FOR N=7 TO 11
3215 PRINT AT N,12,"
3220 NEXT N
3225 GOTO 1410
3240 PRINT AT 7,13,"  ";AT 8,1
3,"  ";AT 9,13,"  ";AT 10,13
;"  ";AT 11,13,"  "
3245 GOTO 1410
3270 FOR N=8 TO 10
3275 PRINT AT N,13,"
3280 NEXT N
3285 GOTO 1410
4000 PRINT "YOU MADE IT.....WELL
 DONE"
4010 FOR N=1 TO 160
4020 NEXT N
4030 SCROLL
4040 PRINT "TRY AGAIN?"
4050 INPUT Z$
4060 SCROLL
4070 IF Z$="Y" THEN RUN
4075 PRINT "OK THEN....BYE"
4080 STOP
5000 PRINT  YOU RAN OUT OF TIME.
 TOUGH"
5010 GOTO 4010
7000 CLS
7005 PRINT TAB 5,"******MAZE****
**"
7007 PRINT
7010 PRINT  THE OBJECT OF THIS G
AME IS TO
7020 PRINT
7030 PRINT  ESCAPE FROM THE 3-D
MAZE BEFORE"
7040 PRINT
7050 PRINT  "YOUR TIME RUNS OUT..
"
7060 PRINT
7070 PRINT "YOU MOVE USING THE K
EYS
7080 PRINT
7090 PRINT "5 TURN LEFT",TAB 0,"
7 FOWARDS",TAB 0,"9 TURN RIGHT"
7100 PRINT
7110 PRINT "THE EXIT IS SHOWN AS
"
7120 PRINT
7130 PRINT "PLEASE WAIT WHILE TH
E GAME
7140 PRINT
7150 PRINT "IS SET UP..."
8000 DIM A$(27,27)
8010 DIM P(6,2)
8015 LET Z$=" 211201110
8020 FOR N=1 TO 4
8025 LET P(N,1)=VAL Z$(N*2-1)-1
8030 LET P(N,2)=VAL Z$(N*2)-1
8035 LET P(N+4,1)=P(N,1)
8040 LET P(N+4,2)=P(N,2)
8045 NEXT N
8050 LET Z$="
"
8055 FOR N=2 TO 22 STEP 4
8060 LET A$(N)=Z$
8065 LET A$(N+1,2)="
8070 LET A$(N+2,2)="
8072 LET A$(N+3,2)="
8075 LET A$(N+1,26)="
8080 LET A$(N+2,26)="
8082 LET A$(N+3,26)="
8085 FOR M=2 TO 22 STEP 4
8090 GOTO 8095+5*(INT (RND*1.5))
8095 LET A$(N+1,M)="
8100 LET A$(N+3,M)="
8105 IF RND>.5 AND A$(N+1,M)="
 OR A$(N+3,M)="  THEN LET A$(N+
2,M)="
8109 NEXT M
8110 NEXT N
8115 LET A$(26)=Z$
8120 LET P=14+4*INT (RND*3)
8125 LET Q=6+4*INT (RND*5)
8130 LET A$(P+1,Q)="
8135 LET A$(P+2,Q)="
8137 LET A$(P+3,Q)="
8140 LET A$(P-1,Q)="
8145 LET A$(P-2,Q)="
8147 LET A$(P-3,Q)="
8150 LET A$(P-5,Q)="
8152 LET A$(P,Q-1)="
8154 LET A$(P,Q+1)="
8155 LET A$(P-6,Q)="
8156 LET A$(P-7,Q)="
8160 LET P=P+2
8170 LET T=151
8410 LET U=2+24*INT (RND*2)
8420 LET V=2
8430 LET D=5+(U=26)
8432 LET Z=4+4*INT (AND*6)
8435 FOR N=1 TO 3
8440 LET A$(6+4*INT (RND*6),Z)="
"
8445 NEXT N
8450 CLS
8799 RETURN
8900 CLEAR
8910 SAVE "MAZE"
8920 RUN
9000 STOP
```



Sample screen displays from Lost!

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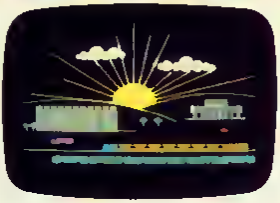










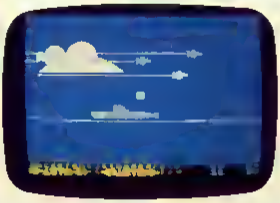






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The soft touch

James Walsh gives us his views on some more Spectrum Software.

Laser Snaker — PoppySoft

Laser Snaker is written for the 48K Spectrum and is based around the theme of the traditional snake game in which the snake must eat the eggs Fortunately, 'Laser Snaker has a few added extras The scenario goes as follows

The laser snake must penetrate the hidden depths of the egg plantation and discover the secret symbol which is your key to success and fortune Fortune? Yes, there is a £100 prize to be won, not quite a fortune but very nice for just playing games Lurking in the plantation are Aggronoids, vicious green monsters There is also the snake s arch enemy the Blue Viproid who also spends his time eating the eggs and will cause you to be destroyed if you hit him Your snake has a laser this is definitely a mutation of the technological age, as I am sure that when I was taught about snakes they still used venom! Anyway this laser is capable of slicing up a Viproid or destroying an Aggronoid If a Viproid is hit straight between the eyes he will return to an egg, which can be gobbled up Death chrystoids appear and must either be shot or avoided Many mazes must be penetrated before heading for the power crystal This rejuvenates the snake, and puts you to a higher status level

Though the idea of the game is not particularly original, this is for the most part made up for by the colourful graphics, lightning speed and versatility of play As a beginner a training level may be selected to give yourself a decent chance Speed may be increased up to a near impossible level Difficulty can also be selected independently of the speed A problem is caused by the rather thoughtless selection of the cursor keys for controlling the snake — they are far from logically placed for movements Obviously the use of the correct joystick would solve this problem

Apart from this flaw the game is colourful, exciting and a pleasure to play, even if it is not the most innovative piece of software on sale today

Chequered Flag — Psion

Chequered Flag, writtenfor the 48K Spectrum by Psion is, as usual on sale under the Sinclair flag

Psion have produced probably the first top quality motor racing simulation program for the Spectrum It uses some of the most colourful and exciting graphics yet seen on the Spectrum

Not surprisingly the aim of the game is to negotiate your way round any of a selection of circuits selectable before you start. But nothing is that simple The corners are tight, and must be taken at speed There are hazards on the road — oil, water and glass The screen is basically split up into two sections The top two thirds is used to display the road and hazards ahead Whilst the lower third displays various meters vital to the running of a car The dashboard features fully analogue fuel gauge rev counter and temperature gauge The gear stick is displayed showing what gear the car is in Finally there is the steering wheel, which rotates as the car is cornered The road and other hazards are displayed fast and furiously in realistic hi res graphics The effect is quite stunning

When the game is loaded it displays a choice of ten different tracks of varying shapes and sizes You are also given a choice of three formula one racing cars — the Ferett Turbo Psion Pegasus and McFaster Special Each car having a different performance and handling characteristics The McFaster Special has an automatic gearbox, which is exceedingly useful for the beginner

Once you have set off you must do your utmost to avoid such hazards as oil, water, glass and rocks If your car is damaged or needs refuelling you may pull into the pits and get attention The overall feel of the car is surprisingly close to the real thing The engine sound effects allows you to gauge whether the engine is being over or under revved

Chequered Flag is one of the best programs sold for the Spectrum It is an exciting graphically impressive and highly enjoyable game to play — definitely a winner

Gangsters! — CCS Strategy Games

Written for the 48K Spectrum, as the name implies this is a game involving 1920's style gangsters but this is where the obvious part ends Surprisingly enough this is not a game of the shoot em up variety has nothing to do with space and does not usa high speed hi res graphics Rather it is a game of strategy, thought and cunning As with other CCS games Gangsters! is based on your feeding the computer with various decisions on spending and deployment of non capital resources ie manpower etc With the computer returning facts and figures on your success or failure

Gangsters! is set in the US during the 20's and is based around the legendary gangland activity of the time The aim of the game is to take over the City from the other gang leaders To do this you must take control of the assets, make raids kill off the other gangsters and their leaders, whilst also managing to stay alive yourself

There are nine levels of play — an advantegeous factor for the beginner You are given a certain amount of money depending upon level of play With this money assets may be bought — Speakeasies Distilleries Casinos Brothels as well as gangsters At all times you must have enough men to carry out raids sufficient protection to safeguard yourself as well as spare cash for bribery The game is fully interactive hence the opposing gangsters are likely to raid your assets and hunt for your weapons

Gangsters! has been well put together nicely presented and the instructions are also well thought out The scenario is original in many respects it gives the idea of strategy games a new breath of life Finally I have to say that it is excellent and well worth the money

Battle of the Toothpaste Tubes — Castle Colditz — K-Tel

So someone was short of a real theme with a name like Battle of the Toothpaste Tubes who can take it seriously? Fortunately the title does not do credit to the game itself it has been imaginatively conceived with the use of fast moving high resolution graphics as well as entertaining sound effects

You must fire the toothpaste onto the heads of the tooth brushes If you miss and hit the handles it will rebound and hit you Mini tubes fire at you you can protect yourself with a flouride shield or simply by firing at them Lastly beware the chattering teeth they can penetrate shields — one bite is lethal

Being given a healthy number of lives to begin with produces a sense of security to stay alive is not easy, you must be constantly alert and on your toes

Battle of the Toothpaste Tubes' (BTT) is a good game thought the scenerio is corny to say the least. But above all it is fun to play

Castle Colditz is an adventure game, In which you are being held prisoner in — of course the Castle Colditz. Surprise surprise your task is to escape! To this end you must make your way from the prisoners' room through a complexed arrangement of tunnels and passages to the Front Gate and freedom

Sadly, this game is without graphics which is rather annoying and poor for an adventure game of today There may well be too many tunnels and passages for you to remember hence necessitating the drawing of a

map As you wander you may collect various object which are scattered around There seems to be rather an abundance of treasure here

Castle Colditz on its own is far from inspiring, and certainly not a program to be bought on its own, but sold with BTT it makes much better sense Overall this cassette is good but far from mindblowing especially as the product of such a well established company as K Tel

Rabbit Shoot —Phipps Associates

Phipps Associates has a good name for producing quality adventure games Rabbit Shoot is for the 16K machine and definitely breaks that

You are a poacher and your task is to shoot as many rabbits as possible whilst they hop around the enclosure But there is a time limit, for after about two minutes the warden appears out of nowhere and catches you

Within the game itself you are represented by a small cross that shoots funny shaped fireballs Is you miss the rabbit at which you were aiming will disappear for a second or two

Unfortunately Rabbit Shoot definitely does not live up to the normal high standard expected of Phipps Associates Though worse has been seen this game is dull and uninteresting

Space Island — Terminal Software

Space Island is set in the year 2651 on the planet Zyro 20000 years ago the Avafad people of Zyro developed Timespread a machine which enables matter to be reduced to zero mass thus making it transportable at speeds greater than that of light itself Hence time can be changed

Your objective is to disable Timespread and return it to Earth because it has been causing time distortion around the planet Zyro Unfortunately this is where the trouble starts, when you try and land a survey ship on the island Roba where Timespread is situated, your ship is destroyed by Timespread's highly sophisticated defence system There is only one survivor left on Roba, one of your androids who is situated on a small island west of Roba itself Your only chance is to carefully guide this android to the island Roba where it can disable Timespread



You are shown an overhead view of Roba and the surrounding Islands whilst the android is represented by a small cross Occasionally the android will talk to you asking for assistance This is a real time game, so there is little time to sit back and think

Space Island is reasonably original complicated in some respects whilst simple in its concept A good game well worth considering for the long dark evenings

The Tomb of Dracula — Felix Software

The Tomb of Dracula has been written for the 48K Spectrum and as might be gathered from the title is an adventure type game But fortunately it does not come into the category of 'Just another Adventure Game', as do so many others Extensive use has been made of high resolution graphics and sound

The object of the game is to work your way through the tomb to find Dracula's treasure before the sun sets and he arises to follow you around Even by day there are Zombies, Ghouls and Slime Pits to contend with The tomb is large and complicated, hence it is possible to display a plan of the tomb If you land on a staircase it may lead to the £500 000 Vampires Treasure and you will have won the game More likely it will lead down to the next level of the tomb, where the rewards and penalties are greater Wherever you go you will be able to collect stakes for future use

The graphics are good and the sound fun which makes for a very enjoyable and exciting game One that can be well recommended

Ghost Town — Virgin Games

Ghost Town is set in a deserted American town, abandoned after the California Gold Rush It is not as easy to play as most other adventure games, but is quite a challenge for anyone who likes long adventure games

Your aim is to find old Jake Clampett's gold mine and return to the Town Square with the gold But beware the sweltering heat of the desert and steer clear of the Sheriff's Office if possible for if you carelessly wander into one of the cells the door will slam shut and you will be trapped The only major fault of the game is that it has limited graphics so consequently it will only appeal to the more serious games player

Ghost Town is not as much fun or as exciting as most other adventure games, but it is reasonably good value for money

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  (Home Computing Weekly 27/9/83)

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MACHINE SPECIFICATIONS

ZX80

Dimensions
Width 174mm (6 85 in)
Depth 218mm (8 58 in)
Height 38 mm (1 6 in)
Weight 300g (10 5oz)

Microprocessor/Memory
Z80A 3 25 MHz clock
ROM 4K bytes containing BASIC
RAM 1K bytes internal externally expandable to 16K bytes

Display
Requires an ordinary domestic black and white colour TV The lead supplied connecta between the ZX80 and your TV's aerial socket The display organisation is 24 lines of 32 characters per line showing black characters on a white screen The ZX80 does not connect to a printer

Programming
Programs can be entered on the keyboard or loaded from cassette The ZX80 has automatic "wrap round" so lines of program can be any length but not multi-statement lines

Syntax check
The syntax of the entered line is checked character by char acter A syntax error cursor marks the first place the syntax breaks down if there is an error Once any errors have been edited out the syntax error cursor disappears Only syntax error free lines of code are accepted by the ZX80

Graphics
Total of 22 graphics symbols giving 48 x 64 pixels resolution consisting of 10 symbols plus space and inverses Includes symbols for drawing ber charts Under control of your BASIC program any character can be printed in reverse field

Editing
The line edit allows you to edit any line of program or input including statement numbers The edit and cursor control keys are EDIT, RUBOUT, HOME

Arithmetic
Arithmetic operators +,– x, ÷ exponentiate Relational oper ators < > = yielding 0 or – 1 Logical operators AND OR NOT yielding boolean result Relational operators also apply to strings ZX80 BASIC uses 16 bit two's complement arithmetic (± 32767)

Variables
Numeric variable names may be any length must begin with a letter and consist of alphanumerics Every character in the name s compared thus an infinity of unique names is available
String variables may be assigned to or from, shortened but not concatenated String variable names are A$ – Z$ Strings do not require a dimension statement and can be any length
Arrays have a maximum dimension of 255 (256 elements) each Array names consist of a single letter A–Z
Control variable names in FOR NEXT loops consist of a single letter A–Z

Expression evaluator
The full expression evaluator is called whenever a constant or variable is encountered during program execution This allows you to use expressions in place of constants especially useful in GOTOs GOSUBs FOR NEXT etc

Immediate mode
The ZX80 will function in the "calculator mode" by immediately executing a statement If it is not preceded with a line number

Cassette interface
Works with most domestic cassette recorders The transfer rate is 250 baud using a unique tape-recording format Other systems are not compatible with the ZX80's The ZX80 also SAVEs the variables as well as the program on cassette Therefore you can save the data for updating next time the program is executed The ZX80 does not support separate data files The lead supplied with the ZX80 is fitted with 3 5mm jack plugs

Expansion bus
At the rear has 8 data, 16 address 13 control lines from the processor and Ov, 5v 9 11v, 0 and internal memory control line These signals enable you to interface the ZX80 to your own electronics PIO, CTC, SIO if you went I/O ports etc

Power supply
The ZX80 requires approximately 400mA from 7–11v DC It has its own internal 5v regulator

TV standard
The ZX80 is designed to work with UHF TVs (channel 36)and is the version required for use in the United Kingdom The ZX80 USA is designed to work with a VHF TV(American channel 2 European channel 3) and is the version required for the American TV system, also for countries without UHF

ZX81

Dimensions
Width 167mm (6 32 in)
Depth 175mm (6 80 in)
Height 40 mm (1 57 in)
Weight 350 gms (12 15 oz)

Microprocessor/Memory
Z80A 3 25 MHz clock
ROM Containing 8K BASIC Interpreter
RAM 1K bytes internal, externally expandable to 16K bytes

Keyboard
40 key touch sensitive membrane Using function mode and single press key word system this gives the equivalent of 91 keys and also graphics mode allows an additional 20 graphical and 54 inverse video characters to be entered directly

Display
Requires an ordinary domestic black and white or colour TV The aerial lead supplied connects the ZX81 to the TV aerial socket The display is organised as 24 lines of 32 characters with black characters on a white background

Two mode speeds
The ZX81 can operate in two software selectable modes FAST and NORMAL FAST is ideal for really high speed computing In NORMAL mode however the ZX81 allows continuously moving, flicker free animated displays

Printer
The 8K ROM will permit instructions (LPRINT LLIST and COPY) to drive the Sinclair ZX Printer

Programming
Programs can be entered via the keyboard or loaded from cassette Programs and data can be saved onto cassette so that they

are not lost when the ZX81 is turned off

Syntax check
The syntax of a line of program is checked on entry. A syntax error cursor marks the first place the syntax breaks down if there is an error. The syntax error cursor disappears when errors have been corrected. Only lines free from syntax errors will be entered into the program.

Graphics
Apart from the 20 graphics characters, space and its inverse, the display may also be div ded into 64 x 44 pixels each of which may be 'blacked' in or 'whited' out under program control

Editing
A line editor allows you to edit any line of program or input, including program line numbers. Lines may be deleted in creased or decreased in size

Arithmetic
Arithmetic operators +, —, x, /, exponentiate. Relational oper ators " < > = > < < " >=, may compare string and arithmetic variables to yeild 0 (False) or 1 (True). Logical operators AND, OR, NOT yield boolean results

Floating point numbers
Numbers are stored in 5 bytes in floating point binary form giving a range of ± 3 x 10 "to ± 7 x 10"accurate to 9½ decimal digits

Scientific functions
Natural logs/antilogs. SIN, COS, TAN and their inverses SOR ex

Variables

Numerical	any letter followed by alphanumerics
String	A$ to Z$
FOR NEXT loops	A—Z (loops may be nested to any depth
Numerical arrays	A—Z
String arrays	A$ to Z$

Arrays
Arrays may be m ulti d mensional with subscripts starting at 1

Expression evaluator
The full express on evaluator is called whenever an expression constant or variable is encountered during program execution. This powerful feature allows use of expressions in place of constants and is especially useful in GOTO, GOSUB etc

Command mode
The ZX81 will execute statements immediately, enabling it to perform like a calculator

Cassette interface
Works using domestic cassette recorders. The transfer rate is 250 baud and uses a unique recording format not compatible with other systems. The ZX81 will save the data as well as the program to avoid the need to re-enter the data when the program is next loaded.
ZX81 will search through a tape for the required program. The cassette leads supplied have 3.5 mm jack plugs

Expansion port
At the rear this has the full data, address and control buses from the Z80A CPU as well as 0V, +5V, +9V, 0 and the mem ory select lines. These signals enable you to interface the ZX81 to the S nclair 16K RAM pack and ZX printer

Power supply
The ZX81 requires approximately 420mA at 7—11V DC. It has its own internal 5V regulator. The ready assembled ZX81 comes complete with a power supply. The ZX81 kit does not include a power supply

TV standard
The ZX81 is designed to work with UHF TVs (channel 36) 625 lines

ZX SPECTRUM

Dimensions
Width 233 mm
Depth 144 mm
Height 30 mm

CPU/Memory
Z80A microprocessor running at 3.5 MHz. 16K byte ROM con taining BASIC interpreter and operating system
16K byte RAM (plus optional 32K byte RAM on Internal expan sion board) or 48K byte RAM

Keyboard
40 key keyboard with upper and lower case with capitals lock feature. All BASIC words obtained by single keys, plus 16 graphics characters, 22 colour control codes and 21 user definable graphics characters. All keys have auto repeat

Display
Memory mapped display of 256 pixels x 192 pixels, plus one at- tributes byte per character square, defining one of eight foreground colours, one of eight background colours, normal or ex tra brightness and flashing or steady. Screen border colour also settable to one of eight colours. Will drive a PAL UHF colour TV set, or black and white set (which will give a scale of grey), on channel 36

Sound
Internal loudspeaker can be operated over more than 10 octaves (actually 130 semitones) via basic BEEP command. Jack sockets at the rear of computer allow connections to external amplifier/ speaker

Graphics
Point, line, circle and arc drawing commands for high-resolution graphics
16 pre-defined graphics characters, plus 21 user-definable graphics characters. Also functions to yield character at a given position, attribute at a given position (colours, brightness and flash) and whether a given pixel is set. Text may be written on the screen on 24 lines of 32 characters. Text and graphics may be freely mixed

Colours
Foreground and background colours, brightness and flashing are set by BASIC INK, PAPER, BRIGHT and FLASH commands. OVER may also be set, which performs an exclusive — or operation to overwrite any printing or plotting that is already on the screen. IN VERSE will give inverse video printing. These six commands may be set globally to cover all further PRINT, PLOT, DRAW or CIRCLE commands, or locally within these commands to cover only the results of that command. They may also be set locally to cover text printed by an INPUT statement. Colour control codes, wh ch may be accessed from the keyboard, may be inserted into text or pro gram listing, and when displayed will override the globally set col ours until another control code is encountered. Brightness and flashing codes may be inserted into program or text similarly. Colour control codes in a program listing have no effect on its ex ecution. Border colour is set by a BORDER command. The eight colours available are black, blue, red, megneta, green, cyan, yellow and white. All eight colours may be present on the screen at once, with some areas flashing and others steady, and any area may be highlighted extra bright

Screen
The screen is divided into two sections. The top section — normal- ly the first 22 lines — displays the program listing or the results of program or command execution. The bottom section — normally the last 2 lines — shows the command or program line currently be ing entered, or the program line currently being edited. It also shows the report messages. Full editing facilities of cursor left, cursor right, insert and delete (with auto-repeat facility) are available over this line. The bottom section will expand to accept a current line of up to 22 lines



Mathematical Operations And Functions
Arithmetic operations of + - x / and raise to a power
Mathematical functions of sine, cosine, tangent and their inverses, natural logs and exponentials, sign function, absolute value function and integer function, square root function, random number generation, and pi
Numbers are stored as five bytes of floating point binary — giving a range of $+3 \times 10^{-38}$ to $+7 \times 10^{38}$ accurate to 9½ decimal digits
Binary numbers may be entered directly with the BIN function
= > < >= <= and <> may be used to compare string or arithmetic values or variables to yield 0 (false) or 1 (true). Logical operators AND, OR and NOT yield boolean results but will accept 0 (false) and any number (true)
User-definable functions are defined using DEF FN and called using FN. They may take up to 26 numeric and 26 string arguments and may yield string or numeric results
There is a full DATA mechanism using the commands READ, DATA and RESTORE
A real time clock is obtainable

String Operations And Functions
Strings can be concatenated with + String variables or values may be compared with = > < >= <= <> to give boolean results. String functions are VAL, VAL$, STR$ and LEN. CHR$ and CODE convert numbers to characters and vice versa, using the ASCII code. A string slicing mechanism exists, using the form a$ (x TO y)

Variable Names
Numeric — any string starting with a letter (upper and lower case are not distinguished between) and spaces are ignored)
String — A$ to Z$
FOR-NEXT loops — A to Z
Numeric arrays — A to Z
String arrays — A$ to Z$
Simple variables and arrays with the same name are allowed and distinguished between

Arrays
Arrays may be multi-dimensional with subscripts starting at 1
String arrays, technically character arrays, may have their last subscript omitted, yielding a string

Expression Evaluator
A full expression evaluator is called during program execution whenever an expression, constant or variable is encountered. This allows the use of expressions as arguments to GOTO, GOSUB, etc
It also operates on commands allowing the ZX Spectrum to operate as a calculator

Cassette Interface
A tone leader is recorded before the information to overcome the automatic recording level fluctuations of some tape recorders and a Schmitt trigger is used to remove noise on playback
All saved information is started with a header containing information as to its type, title, length and address information. Program, screens, blocks of memory, string and character arrays may all be saved separately
Programs, blocks of memory and arrays may be verified after saving
Programs and arrays may be merged from tape to combine them with the existing contents of memory. Where two line numbers or variables names coincide, the old one is overwritten
Programs may be saved with a line number, where execution will start immediately on loading
The cassette interface runs at 1500 baud, through two 3.5 mm jack plugs

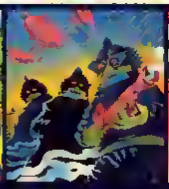
Expansion Port
This has the full data, address and control busses from the Z80A and is used to interface to the ZX Printer, the RS232 and NET interfaces and the ZX Microdrives. IN and OUT commands give the I/O port equivalents of PEEK and POKE

ZX81 Compatibility
ZX81 BASIC is essentially a subset of ZX Spectrum BASIC. The differences are as follows
FAST and SLOW: the ZX Spectrum operates at the speed of the ZX81 in FAST mode with the steady display of SLOW mode and does not include these commands
SCROLL: the ZX Spectrum scrolls automatically, asking the operator "scroll?" every time a screen is filled
UNPLOT: the ZX Spectrum can unplot a pixel using PLOT OVER and thus achieves unplot
Character set: the ZX Spectrum uses the ASCII character set, as opposed to the ZX81 non-standard set


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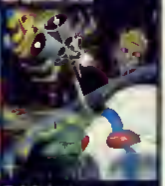
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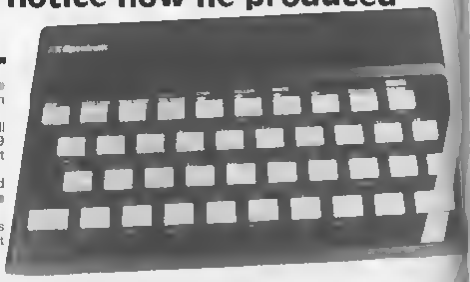
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Duck shoot

Roll up! Roll up! All the fun of the fair! Just like the real thing and just as hard! M Savin produced this effective program — notice how he produced the moving ducks!



OK. So you think you're a crack shot? Well let's see just how good you are in this great little game of Duck Shoot.

Fowl play?

As the game starts a row of 10 cute little yellow ducks will appear at the top of the screen. They zoom across the screen from right to left and, yes you guessed it, you have to try your hand at shooting them. You are armed with a light blue gun (printed as an upside-down T).

The keys from 1 to 5 will move you to the left, keys 8, 9 and 0 will move you to the right and key 7 fires the gun.

You are given 15 bullets and your score is printed up at the end — out of 10.

Don't be fooled — this game is not anywhere as easy as it sounds — so get shooting cowboy!

```
   1 POKE  USR "a", BIN 00000000: POKE  USR "a"+1, BIN 00000000: POKE  USR "a"+2
, BIN 01100000: POKE  USR "a"+3, BIN 11100001: POKE  USR "a"+4, BIN 00111110: PO
KE  USR "a"+5, BIN 00011110: POKE  USR "a"+6, BIN 00000000: POKE  USR "a"+7, BIN
 00000000
   2 POKE  USR "b", BIN 00011000: POKE  USR "b"+1, BIN 00011000: POKE  USR "b"+2
, BIN 00011000: POKE  USR "b"+3, BIN 00011000: POKE  USR "b"+4, BIN 00011000: PO
KE  USR "b"+5, BIN 00011000: POKE  USR "b"+6, BIN 11111111: POKE  USR "b"+7, BIN
 11111111
   3 LET a=0
   4 LET c=10: LET e=10: LET f=9
   5 LET s=0
   6 LET I=0
   9 LET b=0
  10 FOR q=1 TO 9
  16 BORDER 0: PAPER 0: INK 6
  17 LET q$="A  A  A  A  A  A  A  A  A  A  "
  20 IF q$="                                  " THEN  GO TO 600
  22 GO TO 1000
  25 INK 6: PRINT  AT 0,0;q$
  30 LET q$=q$(2 TO )+q$(1)
  34 BEEP .01, 20
  40 INK 5: PRINT  AT c,e;" B
```

STOP! Before typing in this program, please see the Editor's note in the Welcome section



```
 50 IF  INKEY$ ="7" THEN  GO TO 100
 60 IF  INKEY$ ="5" THEN  LET e=e-1: BEEP .005,45
 70 IF  INKEY$ ="8" THEN  LET e=e+1: BEEP .005,45
 80 GO TO 25
 96 PAUSE 0
 97 IF  INKEY$ ="n" THEN  STOP
 98 IF  INKEY$ ="y" THEN  RUN
 99 IF  INKEY$ ="" THEN  GO TO 96
100 LET c$="."
101 LET e=e+1: PRINT  AT 0,0;"
103 INK 6: PRINT  AT 0,0;q$
105 IF q$="                                " THEN  GO TO 600
106 FOR q=40 TO 48
107 INK 6
108 INK 2
109 LET l=l+1: IF l=138 THEN  FLASH 1: PRINT  AT 10,7;"OUT OF BULLETS": BEEP
3,-18: GO TO 600
110 PRINT  AT f,e;c$: FOR k=1 TO 8: NEXT k: PRINT  AT f,e;" "
120 LET f=f-1
125 BEEP  005,q
130 NEXT q
150 LET f=9
160 LET e=e-1
560 IF q$(e+2) <> " " THEN  LET q$(e+2)="  ": LET s=s+1
565 PRINT  AT 0,0;q$
566 IF s=10 THEN  GO TO 600
570 IF  INKEY$ ="7" THEN  GO TO 100
580 GO TO 25
600 FLASH 0: CLS : INK 6: PRINT  AT 10,10; INVERSE 1;"SCORE=";s
601 PRINT  AT 13,0;"y'to play again or 'n'to stop ?"
602 FLASH 1: INVERSE 1: IF s >= 10 THEN  PRINT  AT 11,0;"you have the fastest g
un in the N.W.!": FOR i=50 TO 20 STEP -1: BEEP .1,i: NEXT i
603 PAUSE 0: FLASH 0
604 IF  INKEY$ ="n" THEN  STOP
605 IF  INKEY$ ="y" THEN  RUN
610 IF  INKEY$ ="" THEN  GO TO 602
1000 INK 0: PAPER 5: BORDER 5: INVERSE 1: CLS
1001 PRINT  AT 1,8;"***DUCK SHOOT***"
1002 INVERSE 0: PRINT  AT 2,0;"***@ M.Savin 1982***"
1003 INK 1
1005 PRINT  AT 4,0;" use (";  INVERSE 1;"5";  INVERSE 0;" to move to the left and
";  INVERSE 1;"8";  INVERSE 0;") to move right and ";  INVERSE 1;"7";  INVERSE 0;" t
o ";  INVERSE 1;"FIRE!!";  INVERSE 0;"(you have 10 ducks to shoot at  and 15 bulle
ts) ";  AT 10,10;  INVERSE 1;"GOOD LUCK!!";  INVERSE 0
1012 BORDER 0: PAPER 0: INK 6
1015 PRINT  AT 20,3;"press any key to continue"
1018 PAUSE 0
1019 INK 6
1020 CLS : GO TO 25
```

ZX COMPUTING

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(ZX81 16K SPECTRUM)

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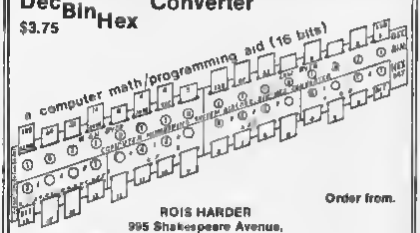
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Educational Software? SAE for details

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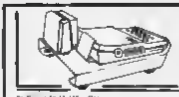
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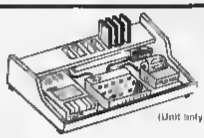
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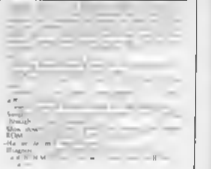
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AD INDEX

A. G. F. HARDWARE	74
ADDICTIVE GAMES	IFC
ATARI	30 & 31
APPLICATIONS	36
CERAN SOFTWARE	51
CAMBELL SYSTEMS	96
CHEETAH MARKETING	26
CASCADE	140
C. C. S.	115
CURRAH COMPUTER COMPONENTS	IBC
COMPUTER AD ONS	126
COMPUSOUND	115
CARNELL	6 & 7
D J MOODY	125
DAVID HUSBAND	51
DISCOUNT SOFTWARE	104
DIGITAL INTEGRATION	18
D K TRONICS	18, 27
EAST LONDON ROBOTICS	12, 22 & 23
FILE SIXTY	50
FOX ELECTRONICS	96
FULLER MICROS	78, 79
INCENTIVE SOFTWARE	84
INTERFACE	55
JOHN WILEY AND SONS	59, 63, 67
KELWOOD COMPUTER CASES	43
KUMA COMPUTERS	104
MEOW MICROS	104
MIKRO GEN	141
MOA	64
MICROSPHERE	136
MR CHIP SOFTWARE	74
ORWIN SOFTWARE	120
PROCOM SOFTWARE	35, 39
P. V. TUBES	51
PINEHURST DATA	130
PICTURESQUE	66
PRENTICE HALL	75
PHIPPS ASSOCS	130
PRINT & PLOTTER	132 & 133
RICHARD SHEPHERD	82, 70 & 71
SILVERSOFT	OBC
SOFTWARE SUPKT	3
SOFTWARE BANK	130

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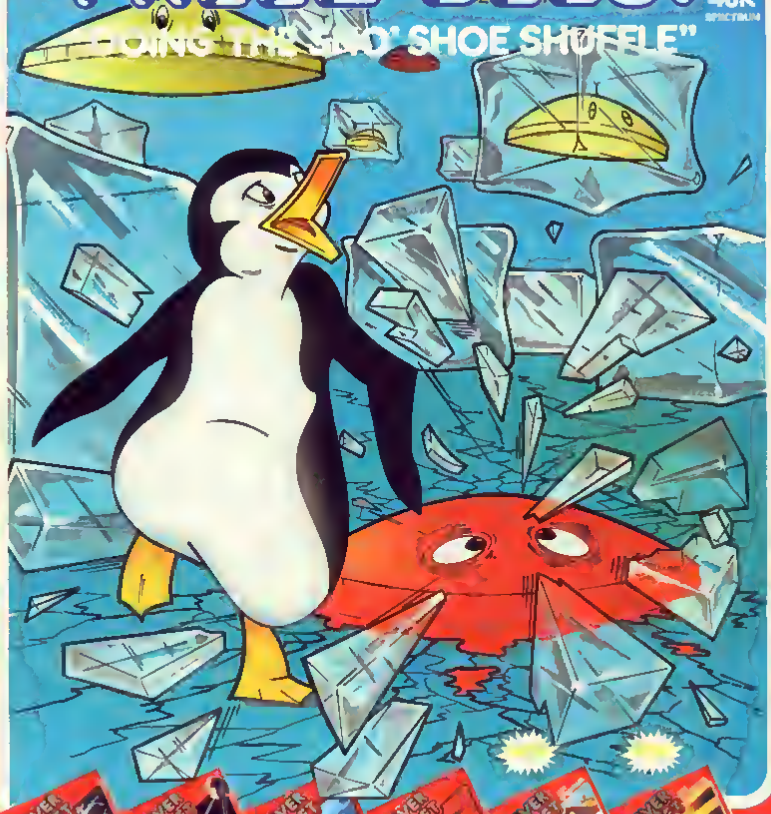
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